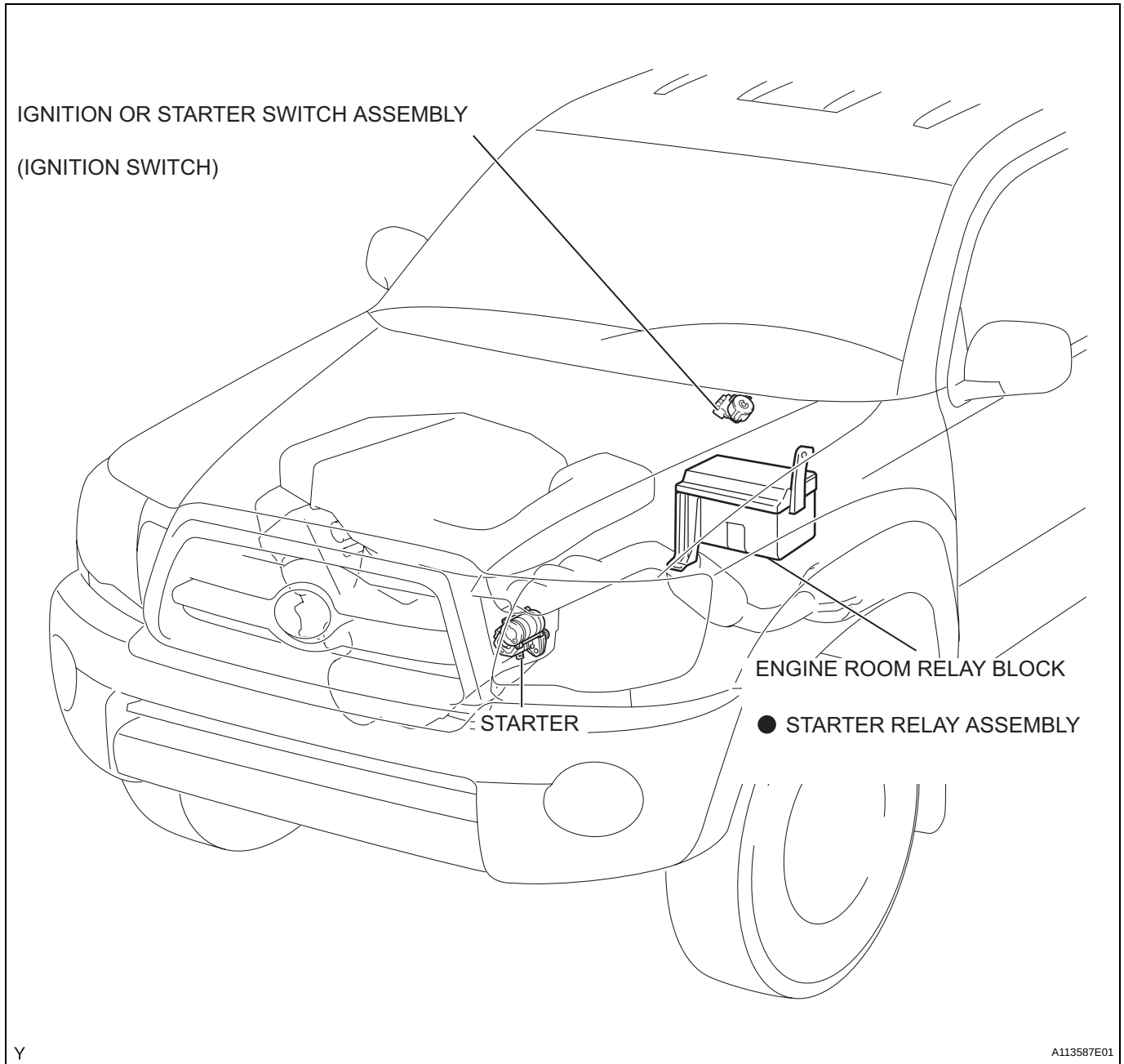


STARTING SYSTEM

PARTS LOCATION

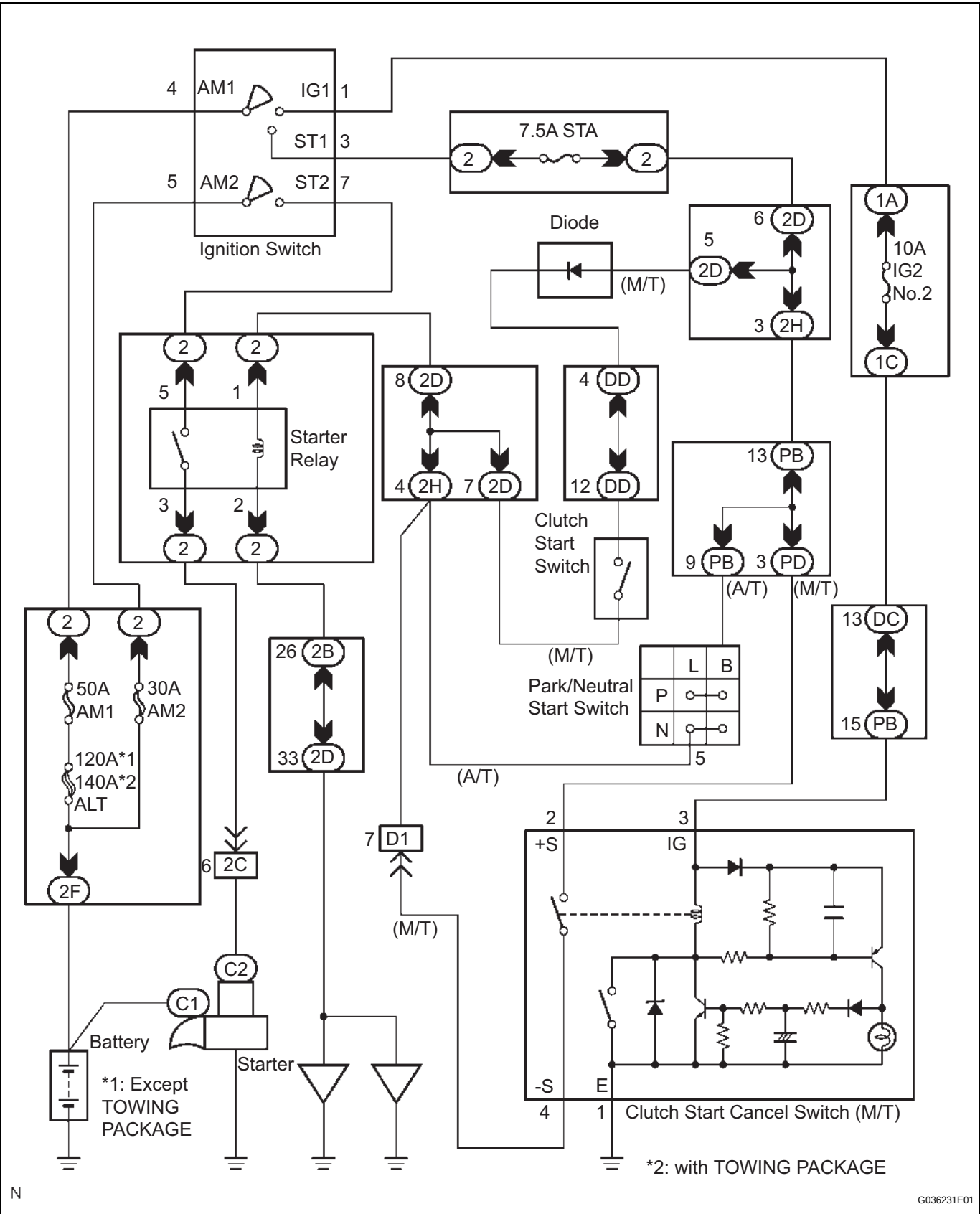


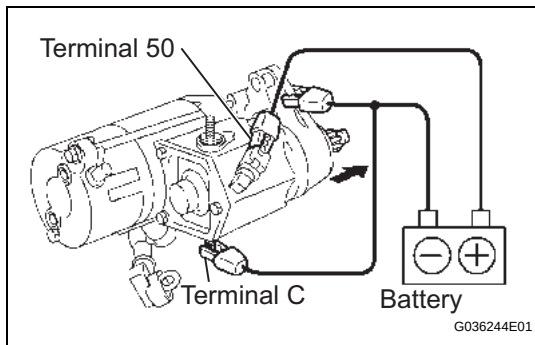
Y

A113587E01

ST

SYSTEM DIAGRAM





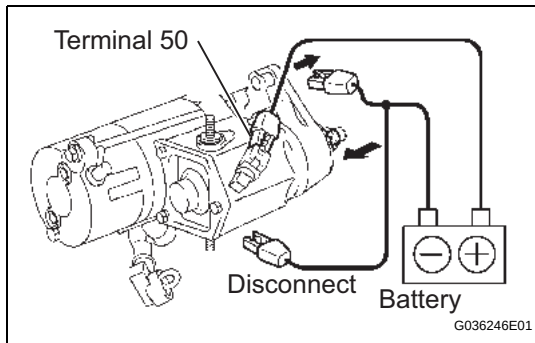
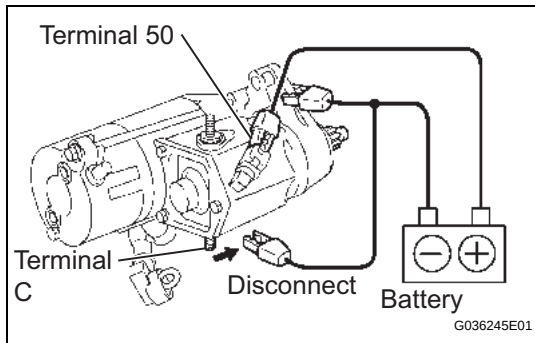
INSPECTION

1. INSPECT STARTER ASSEMBLY

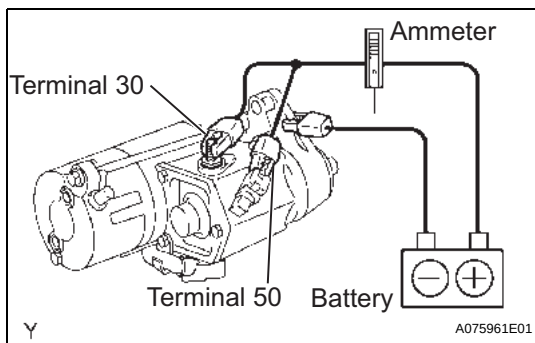
NOTICE:

These tests must be performed within 3 to 5 seconds to prevent burnout of the coil.

- (a) Perform the pull-in test.
 - (1) Remove the nut, then disconnect the lead wire from terminal C.
 - (2) Connect the battery to the starter magnetic switch as shown in the illustration. Check that the clutch pinion gear is extended. If the clutch pinion gear does not move, replace the magnet starter switch.
- (b) Perform the hold-in test.
 - (1) Disconnect the negative (-) lead from terminal C. Check that the clutch pinion gear is extended. If the clutch pinion gear returns inward, replace the magnet starter switch.



- (c) Check the operation.
 - (1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear returns. If the clutch pinion gear does not return inward, replace the magnet starter switch.



- (d) Perform the no-load performance test.
 - (1) Connect the lead wire to terminal C. Make sure that the lead is not grounded.
 - (2) Clamp the starter in a vise.
 - (3) Connect the battery and an ammeter to the starter as shown in the illustration.
 - (4) Check that the starter rotates smoothly and steadily with the clutch pinion gear extended. Check that the ammeter reads the specified current.

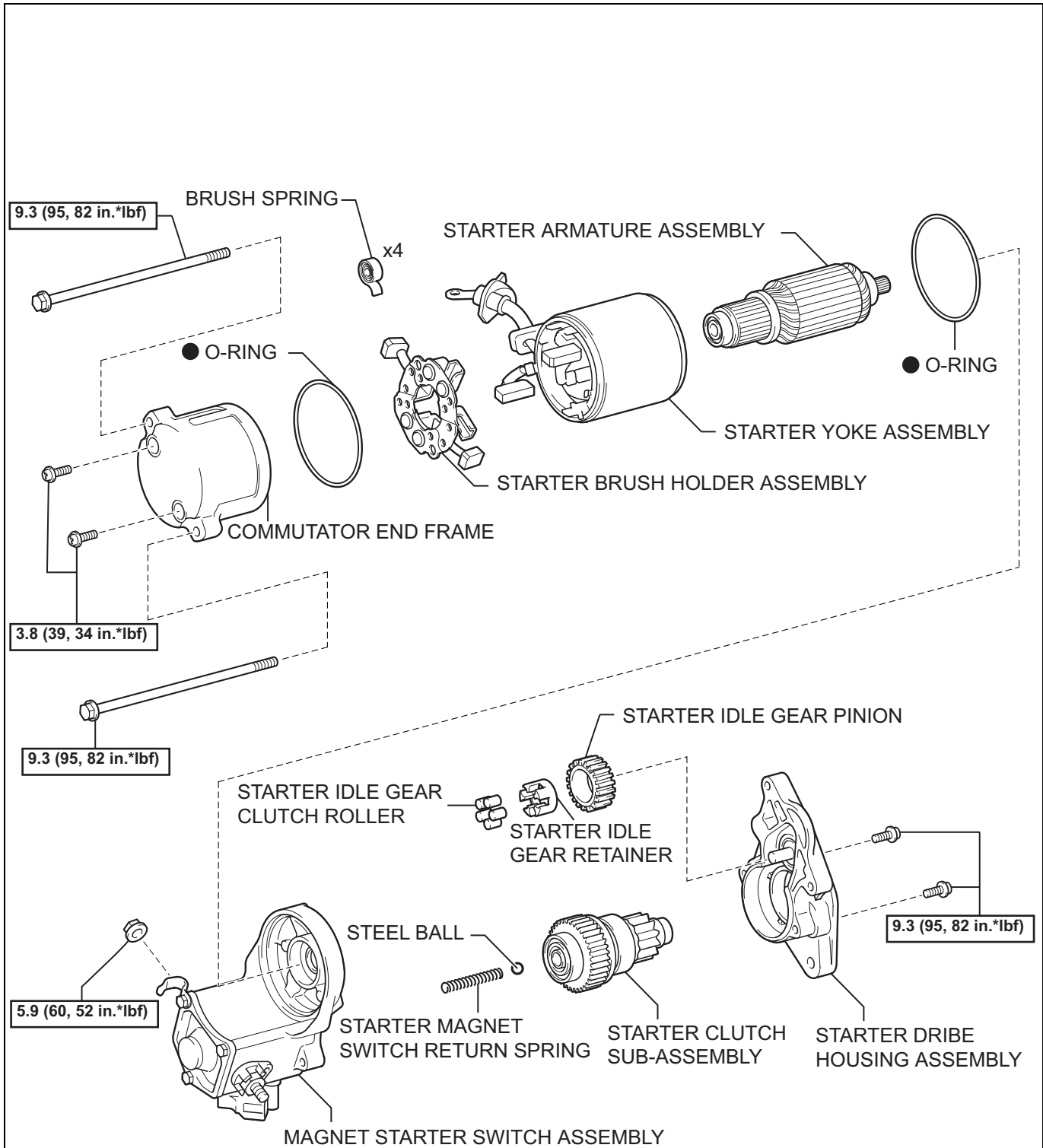
Standard:

100 A or less at 11.5 V

If the result is not as specified, replace the starter.

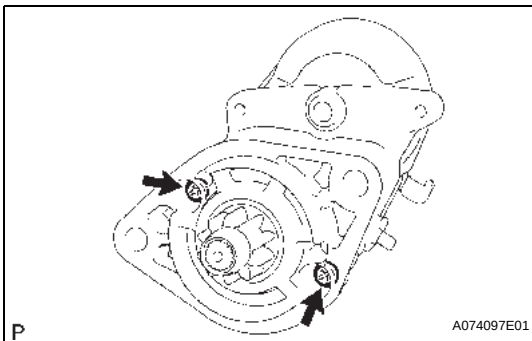
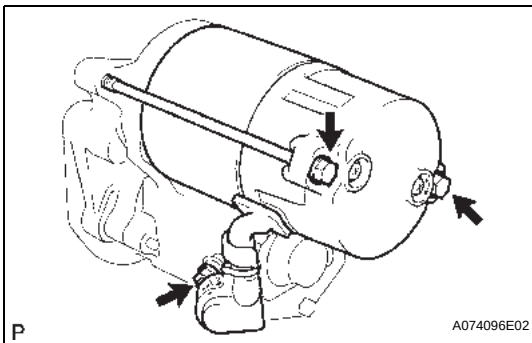
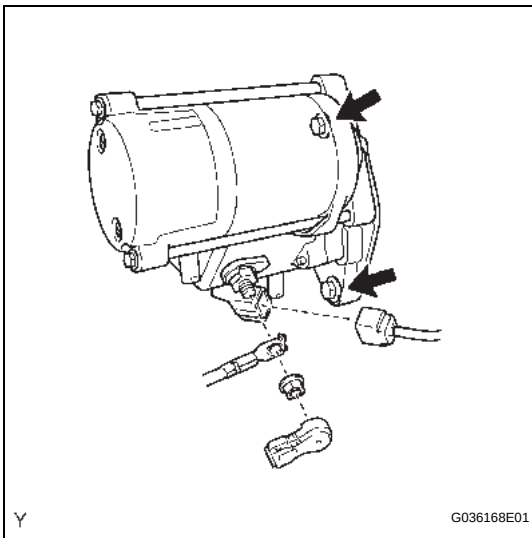
STARTER (for 2WD and Pre-Runner)

COMPONENTS



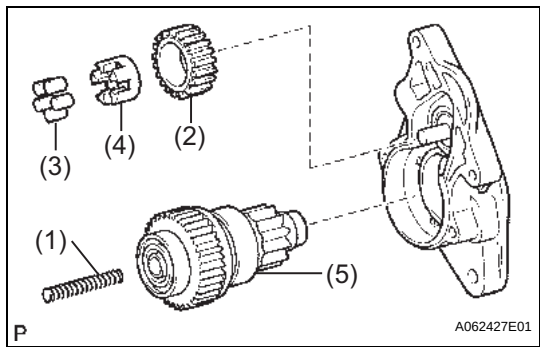
REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO.1 ENGINE UNDER COVER SUB-ASSEMBLY (for Off Road Package)**
 - (a) Remove the 4 bolts, then remove the engine under cover.
3. **REMOVE NO.2 MANIFOLD STAY**
 - (a) Remove the 3 bolts, then remove the manifold stay No. 2.
4. **SEPARATE WIRE HARNESS**
 - (a) Remove the bolt, then separate the earth wire harness from the cylinder block.
5. **REMOVE STARTER ASSEMBLY**
 - (a) Disconnect the terminal 50 connector from the starter assy.
 - (b) Remove the nut, then disconnect the wire harness from terminal 30.
 - (c) Remove the 2 bolts, then remove the starter assembly.



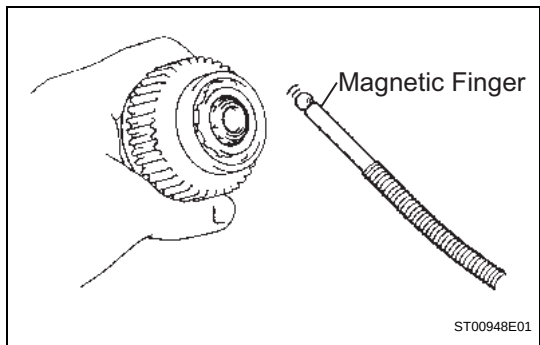
DISASSEMBLY

1. **REMOVE STARTER YOKE ASSEMBLY**
 - (a) Remove the nut, then disconnect the lead wire from terminal C.
 - (b) Remove the 2 through bolts.
 - (c) Pull the starter yoke and the armature out together.
 - (d) Remove the O-ring from the starter yoke.
2. **REMOVE MAGNET STARTER SWITCH ASSEMBLY**
 - (a) Remove the 2 screws, then remove the magnet starter switch.



(b) Remove these parts from the starter drive housing.

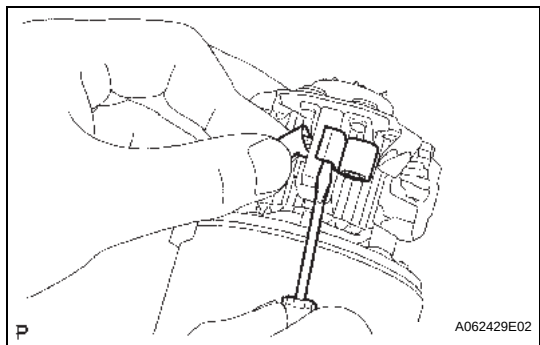
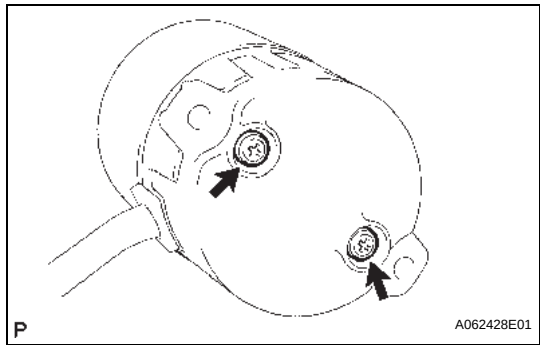
(1)	Starter magnet switch return spring
(2)	Starter idle gear pinion
(3)	Starter idle gear clutch roller
(4)	Starter idle gear retainer
(5)	Starter clutch



(c) Using a magnetic finger, remove the steel ball from the clutch shaft hole.

3. REMOVE STARTER BRUSH HOLDER ASSEMBLY

- (a) Remove the 2 screws, then remove the end frame from the starter yoke.
- (b) Remove the O-ring from the starter yoke.



- (c) Using a screwdriver, hold the spring back and disconnect the 4 brushes from the brush holder.
- (d) Remove the brush holder from the armature.

4. REMOVE STARTER ARMATURE ASSEMBLY

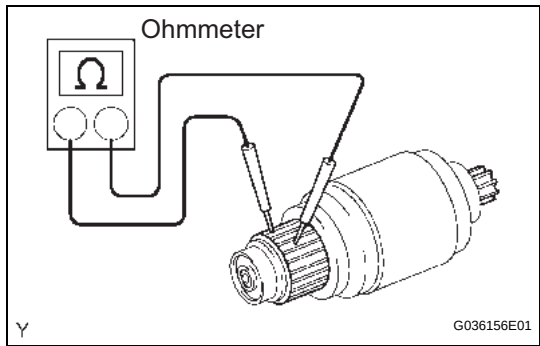
1. INSPECT STARTER ARMATURE ASSEMBLY

- (a) Check the commutator for an open circuit.
 - (1) Using an ohmmeter, measure the resistance between the segments of the commutator.

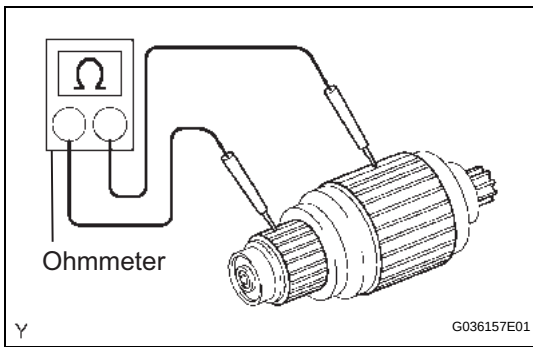
Standard:

1 Ω or lower

If the result is not as specified, replace the starter armature.



INSPECTION

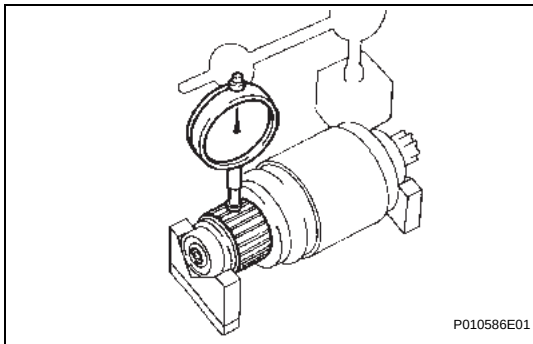


- (b) Check the commutator for ground.
 (1) Using an ohmmeter, measure the resistance between the commutator and armature coil core.

Standard:**10 k Ω or higher**

If the result is not as specified, replace the starter armature.

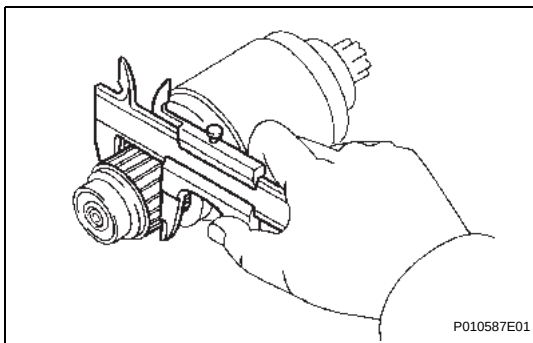
- (c) Check whether the commutator surface is dirty or burnt.
 If necessary, clean it with sandpaper (No. 400) or a lathe.



- (d) Check the commutator for runout.
 (1) Place the commutator on V-blocks.
 (2) Using a dial gauge, measure the runout.

Maximum runout:**0.05 mm (0.0020 in.)**

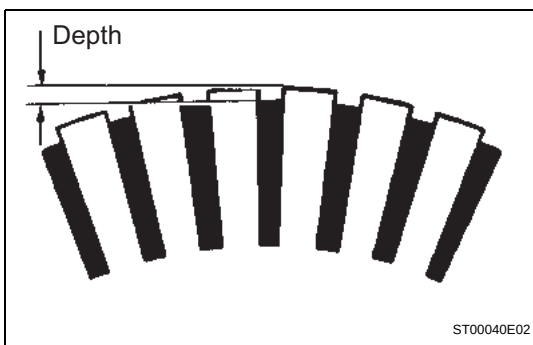
If the runout is greater than the maximum, correct it on a lathe.



- (e) Using vernier calipers, measure the commutator diameter.

Standard diameter:**35.0 mm (1.378 in.)****Minimum diameter:****34.0 mm (1.339 in.)**

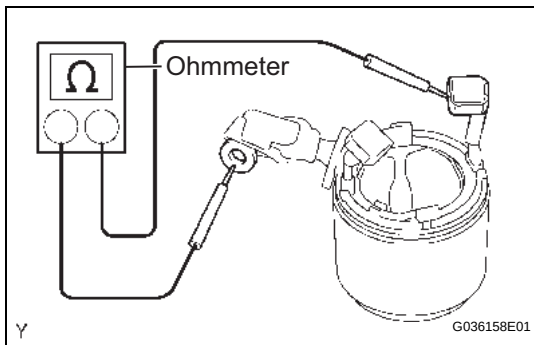
If the diameter is less than the minimum, replace the armature.



- (f) Check that the undercut portion between the segments is free of foreign objects. Measure its depth.

Standard undercut depth:**0.7 mm (0.028 in.)****Minimum undercut depth:****0.2 mm (0.008 in.)**

If the undercut depth is less than the minimum, correct it with a hacksaw blade.



2. INSPECT STARTER YOKE ASSEMBLY

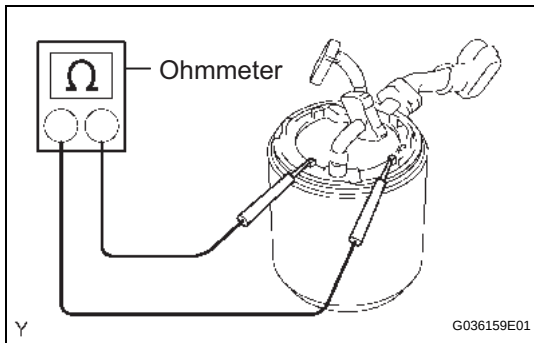
(a) Check the starter yoke for an open circuit.

- (1) Using an ohmmeter, measure the resistance between the lead wire and brushes.

Standard:

1 Ω or lower

If the result is not as specified, replace the starter yoke.



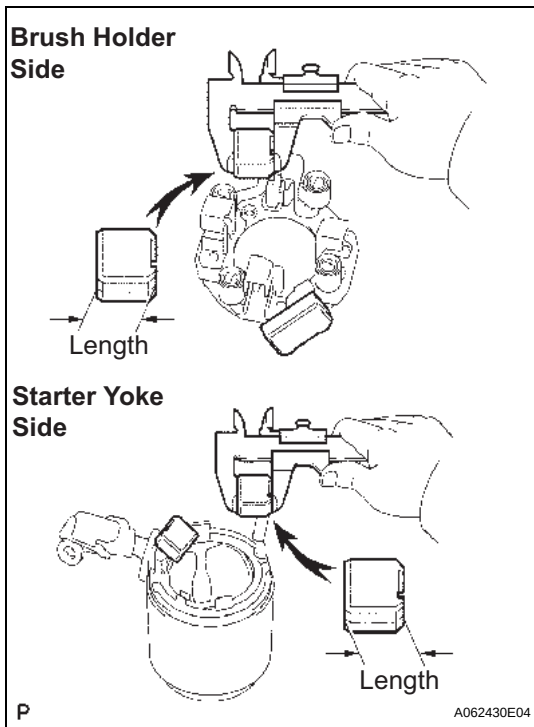
(b) Check the shunt coil for an open circuit.

- (1) Using an ohmmeter, measure the resistance between shunt coil terminals A and B.

Standard:

1.5 to 1.9 Ω at 20°C (68°F)

If the result is not as specified, replace the starter yoke.



3. INSPECT BRUSH

(a) Check the brush length.

- (1) Using vernier calipers, measure the brush length.

Standard length:

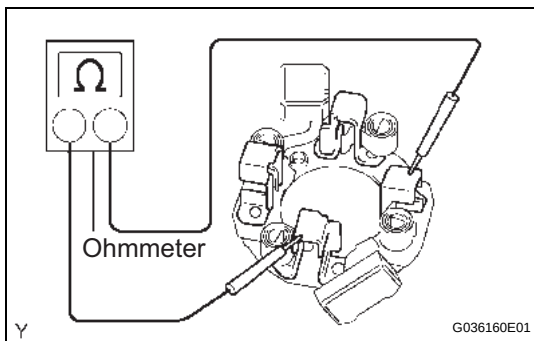
15.0 mm (0.591 in.)

Minimum length:

9.0 mm (0.354 in.)

If the length is less than the minimum, replace the brush holder and starter yoke.

ST



4. INSPECT STARTER BRUSH HOLDER ASSEMBLY

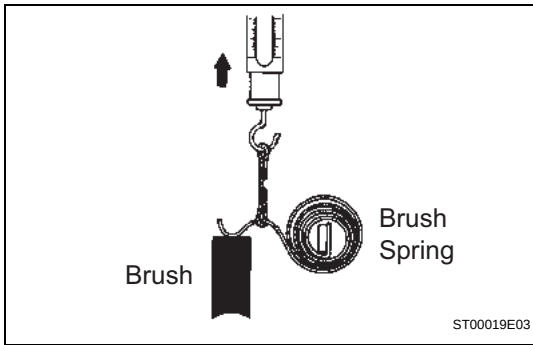
(a) Check the brush holder insulation.

- (1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brush holders.

Standard:

10 k Ω or higher

If the result is not as specified, replace the brush holder.



(b) Check the brush spring load.

- (1) Take the pull scale reading as soon as the brush spring separates from the brush.

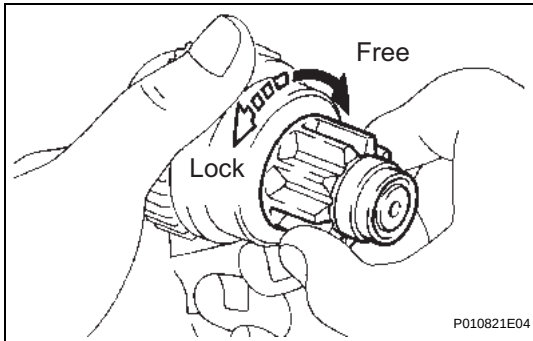
Standard spring load:

21.5 to 27.5 N (2.2 to 2.8 kgf, 4.8 to 6.2 lbf)

Minimum spring load:

12.7 N (1.3 kgf, 2.9 lbf)

If the spring load is less than the minimum, replace the brush holder.

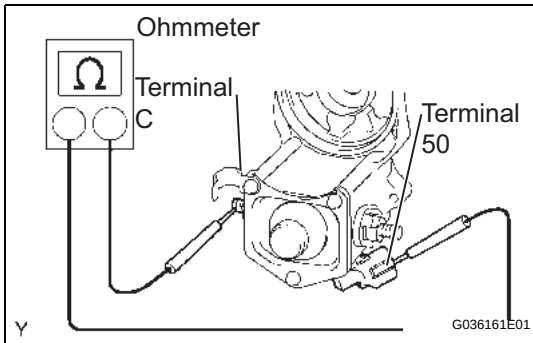


5. INSPECT STARTER CLUTCH SUB-ASSEMBLY

(a) Check the clutch pinion gear.

- (1) Hold the starter clutch, rotate the pinion gear clockwise and check that it turns freely.
- (2) Try to rotate the pinion gear counterclockwise and check that it locks.

If necessary, replace the starter clutch.



6. INSPECT MAGNET STARTER SWITCH ASSEMBLY

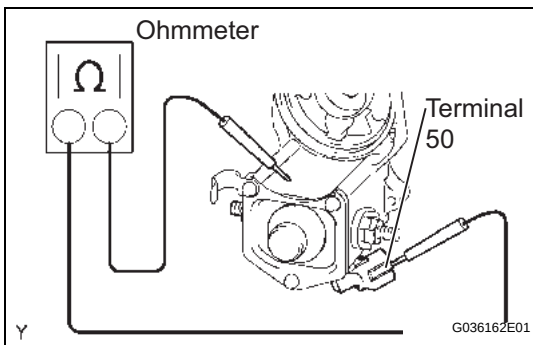
(a) Check the pull-in coil for an open circuit.

- (1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard:

1 Ω or lower

If the result is not as specified, replace the magnet starter switch.



(b) Check the holding coil for an open circuit.

- (1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

Standard:

2 Ω or lower

If the result is not as specified, replace the magnet starter switch.

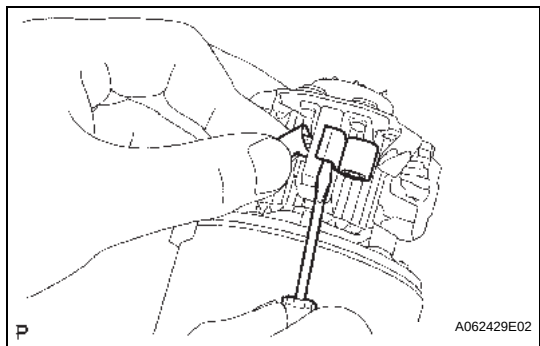
REASSEMBLY

1. INSTALL STARTER ARMATURE ASSEMBLY

- (a) Apply grease to the bearings, and install it onto the starter yoke.

2. INSTALL STARTER BRUSH HOLDER ASSEMBLY

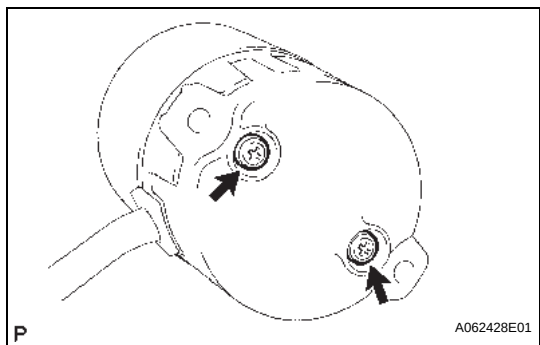
- (a) Place the brush holder on the armature.
- (b) Using a screwdriver, install the 4 brushes.
- (c) Install a new O-ring onto the groove of the field frame.



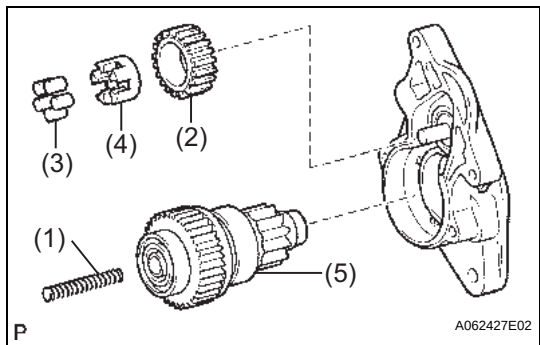
- (d) Install the end frame with the 2 screws.
Torque: 3.8 N*m (39 kgf*cm, 34 in.*lbf)

3. INSTALL MAGNET STARTER SWITCH ASSEMBLY

- (a) Apply grease to the steel ball, and install it onto the clutch shaft hole.



- (b) Apply grease to parts (2) - (5), and install all the parts below onto the starter drive housing.

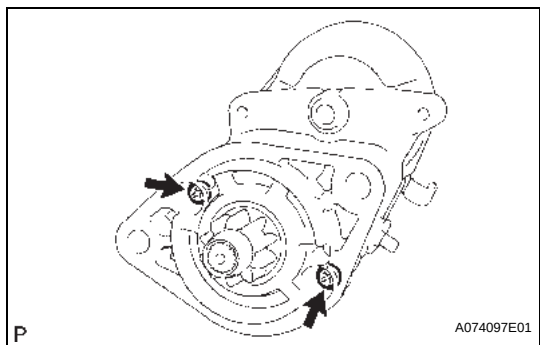


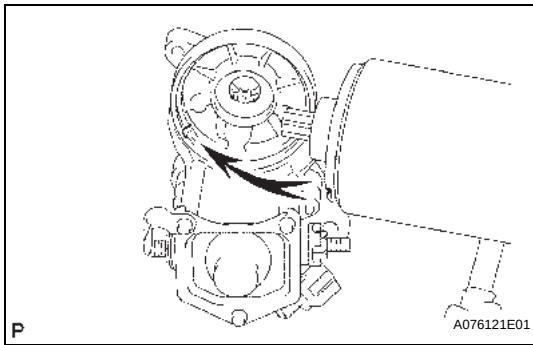
(1)	Starter magnet switch return spring
(2)	Starter idle gear pinion
(3)	Starter idle gear clutch roller
(4)	Starter idle gear retainer
(5)	Starter clutch

- (c) Install the magnet starter switch with the 2 screws.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)

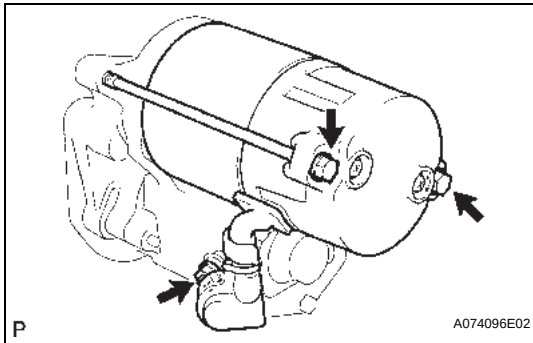
4. INSTALL STARTER YOKE ASSEMBLY

- (a) Install a new O-ring onto the groove of the starter yoke.





- (b) Align the key of the starter yoke with the groove of the magnet starter switch.



- (c) Install the starter yoke and armature with the 2 through bolts.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)
- (d) Connect the lead wire to terminal C with the nut.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)

INSTALLATION

1. INSTALL STARTER ASSEMBLY

- (a) Install the starter assembly with the 2 bolts.

Torque:

37 N*m (377 kgf*cm, 27 ft.*lbf)

- (b) Install the wire harness with the nut to terminal 30.

Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)

- (c) Connect terminal 50 to the starter assy.

2. INSTALL WIRE HARNESS

- (a) Install the earth wire harness onto the cylinder block with the bolt.

Torque: 13 N*m (133 kgf*cm, 10 ft.*lbf)

3. INSTALL NO.2 MANIFOLD STAY

- (a) Install the manifold stay No. 2 with the 3 bolts.

Torque: 40 N*m (408 kgf*cm, 30 ft.*lbf)

4. INSTALL NO.1 ENGINE UNDER COVER SUB-ASSEMBLY (for Off Road Package)

- (a) Install the engine under cover with the 4 bolts.

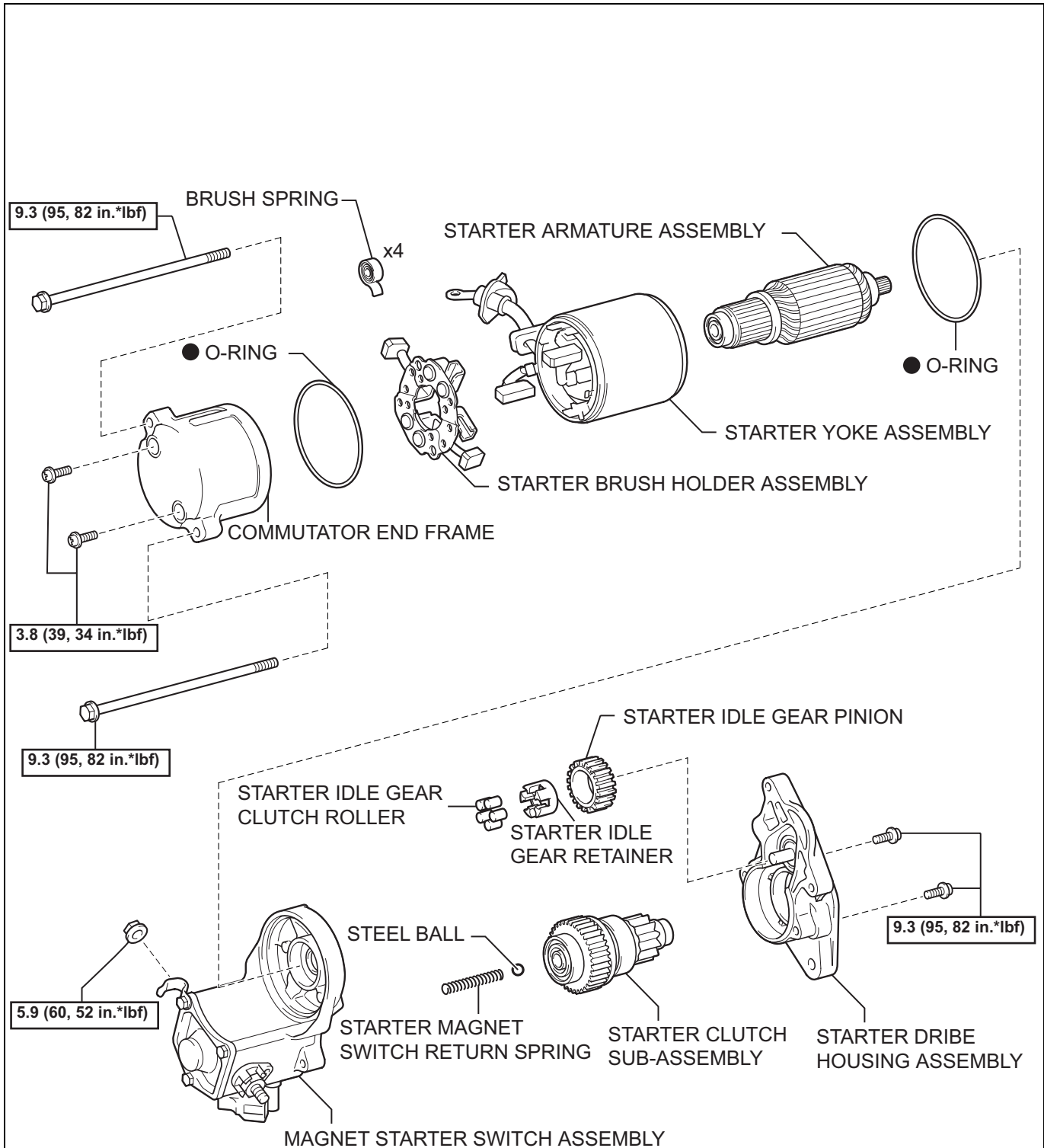
Torque: 30 N*m (306 kgf*cm, 22 ft.*lbf)

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)

STARTER (for 4WD)

COMPONENTS

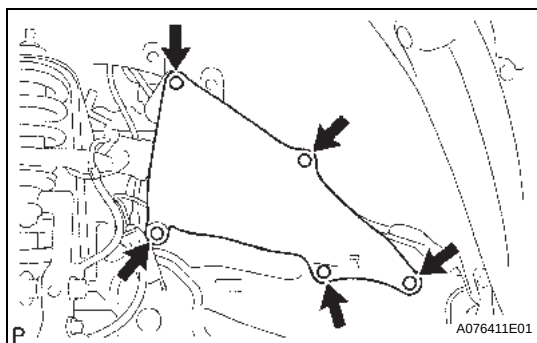


N*m (kgf*cm, ft*lbf) : Specified torque

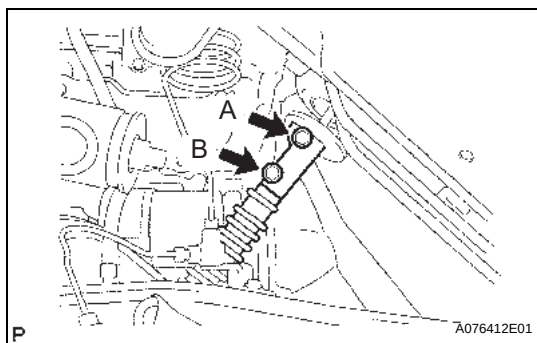
● Non-reusable part

REMOVAL

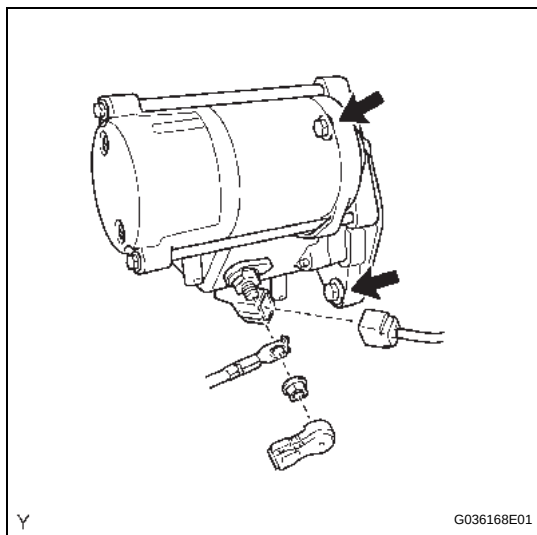
1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
2. **REMOVE NO.1 ENGINE UNDER COVER SUB-ASSEMBLY**
 - (a) Remove the 4 bolts, then remove the engine under cover.
3. **REMOVE NO.2 EXHAUST FRONT PIPE ASSEMBLY**
(See page [EX-3](#))
4. **REMOVE FRONT FENDER SEAL LH**
 - (a) Remove the 5 clips, then remove the front fender splash shield rear LH.

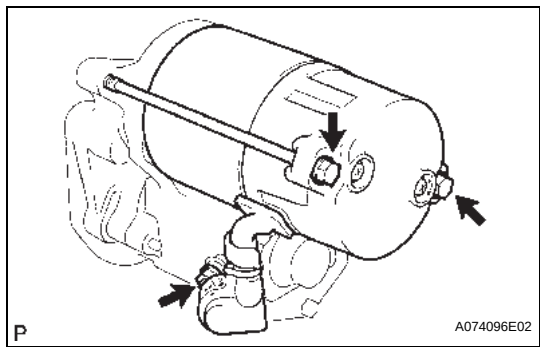


5. **REMOVE NO.2 STEERING INTERMEDIATE SHAFT**
 - (a) Loosen bolt A and remove bolt B, then separate the steering intermediate shaft No. 2



6. **REMOVE STARTER ASSEMBLY**
 - (a) Disconnect the terminal 50 connector from the starter assembly.
 - (b) Remove the nut, then remove the wire harness from terminal 30.
 - (c) Remove the 2 bolts, then remove the starter assembly.

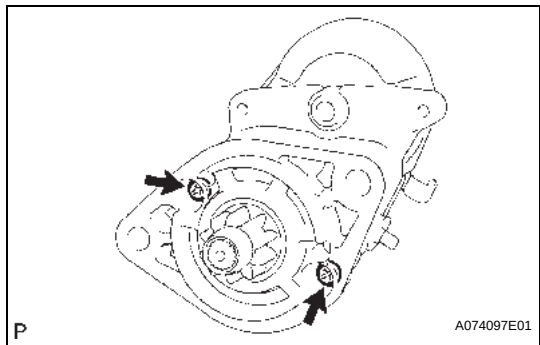




DISASSEMBLY

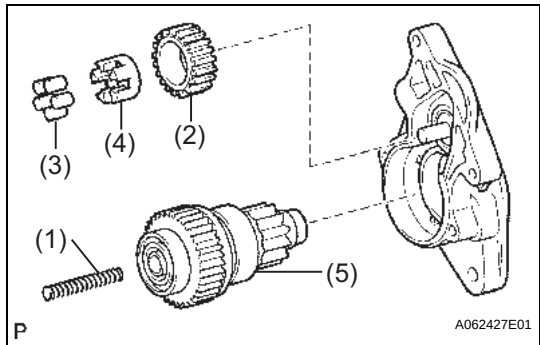
1. REMOVE STARTER YOKE ASSEMBLY

- (a) Remove the nut, then disconnect the lead wire from terminal C.
- (b) Remove the 2 through bolts.
- (c) Pull the starter yoke and the armature out together.
- (d) Remove the O-ring from the starter yoke.



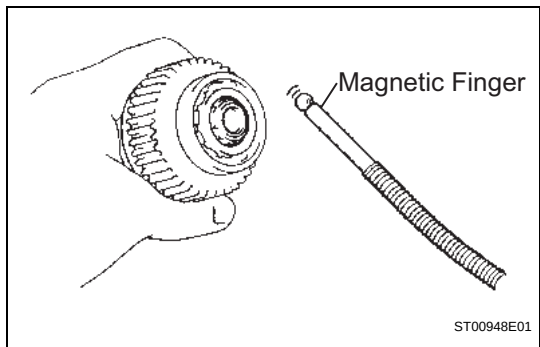
2. REMOVE MAGNET STARTER SWITCH ASSEMBLY

- (a) Remove the 2 screws, then remove the magnet starter switch.

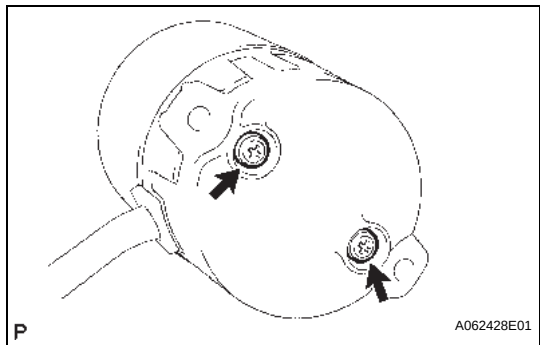


- (b) Remove these parts from the starter drive housing.

(1)	Starter magnet switch return spring
(2)	Starter idle gear pinion
(3)	Starter idle gear clutch roller
(4)	Starter idle gear retainer
(5)	Starter clutch

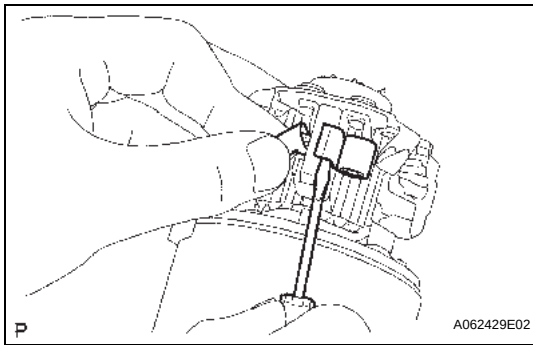


- (c) Using a magnetic finger, remove the steel ball from the clutch shaft hole.



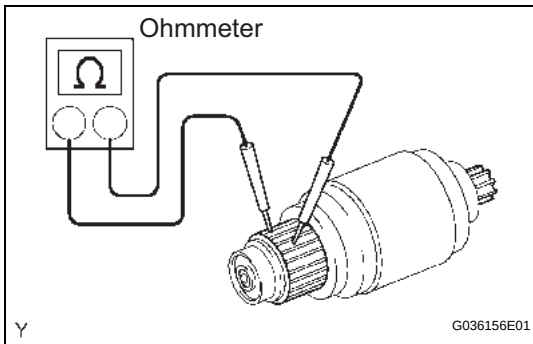
3. REMOVE STARTER BRUSH HOLDER ASSEMBLY

- (a) Remove the 2 screws, then remove the end frame from the starter yoke.
- (b) Remove the O-ring from the starter yoke.



- (c) Using a screwdriver, hold the spring back and disconnect the 4 brushes from the brush holder.
- (d) Remove the brush holder from the armature.

4. REMOVE STARTER ARMATURE ASSEMBLY



INSPECTION

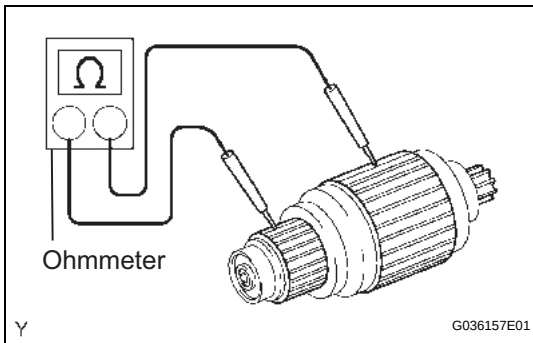
1. INSPECT STARTER ARMATURE ASSEMBLY

- (a) Check the commutator for an open circuit.
 - (1) Using an ohmmeter, measure the resistance between the segments of the commutator.

Standard:

1Ω or lower

If the result is not as specified, replace the starter armature.



- (b) Check the commutator for ground.
 - (1) Using an ohmmeter, measure the resistance between the commutator and armature coil core.

Standard:

10 kΩ or higher

If the result is not as specified, replace the starter armature.

- (c) Check whether the commutator surface is dirty or burnt.

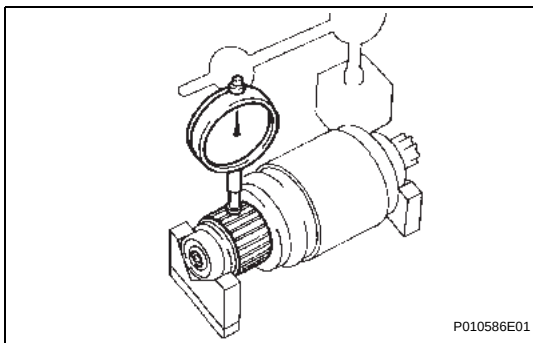
If necessary, clean it with sandpaper (No. 400) or a lathe.

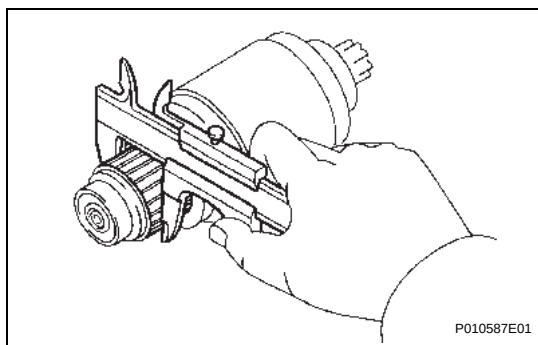
- (d) Check the commutator for runout.
 - (1) Place the commutator on V-blocks.
 - (2) Using a dial gauge, measure the runout.

Maximum runout:

0.05 mm (0.0020 in.)

If the runout is greater than the maximum, correct it on a lathe.





- (e) Using vernier calipers, measure the commutator diameter.

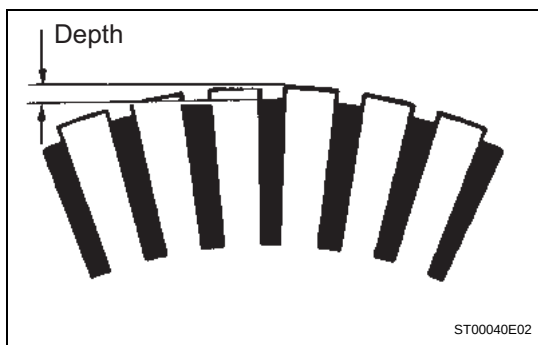
Standard diameter:

35.0 mm (1.378 in.)

Minimum diameter:

34.0 mm (1.339 in.)

If the diameter is less than the minimum, replace the armature.



- (f) Check that the undercut portion between the segments is free of foreign objects. Measure its depth.

Standard undercut depth:

0.7 mm (0.028 in.)

Minimum undercut depth:

0.2 mm (0.008 in.)

If the undercut depth is less than the minimum, correct it with a hacksaw blade.

2. INSPECT STARTER YOKE ASSEMBLY

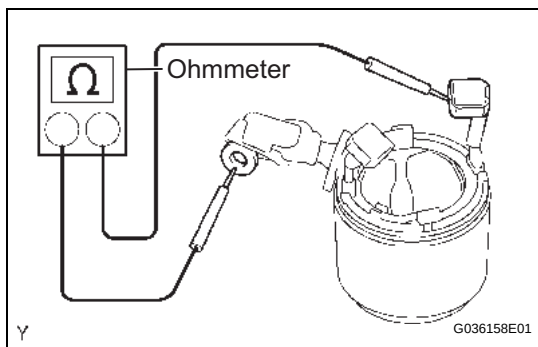
- (a) Check the starter yoke for an open circuit.

- (1) Using an ohmmeter, measure the resistance between the lead wire and brushes.

Standard:

1 Ω or lower

If the result is not as specified, replace the starter yoke.



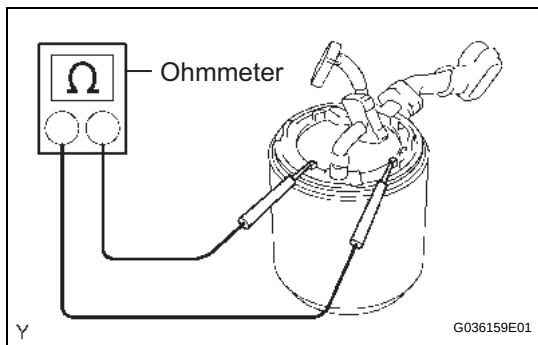
- (b) Check the shunt coil for an open circuit.

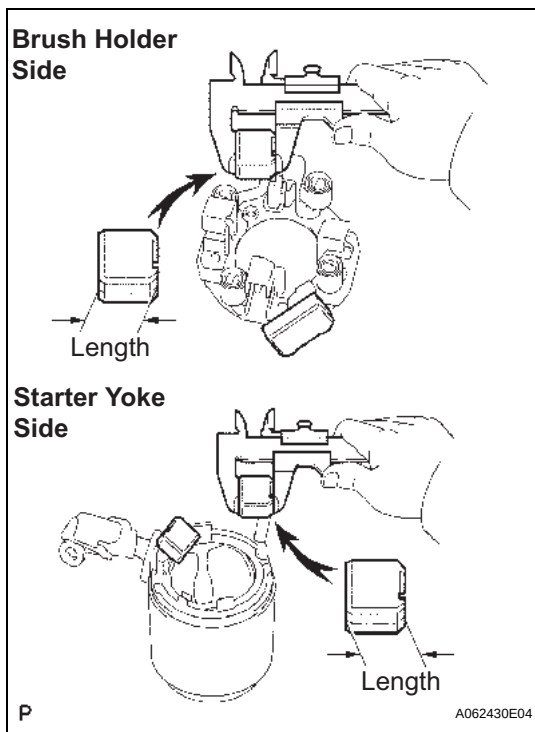
- (1) Using an ohmmeter, measure the resistance between shunt coil terminals A and B.

Standard:

1.5 to 1.9 Ω at 20°C (68°F)

If the result is not as specified, replace the starter yoke.





3. INSPECT BRUSH

- (a) Check the brush length.

- (1) Using vernier calipers, measure the brush length.

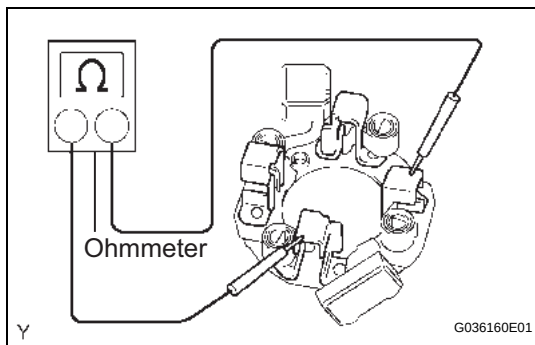
Standard length:

15.0 mm (0.591 in.)

Minimum length:

9.0 mm (0.354 in.)

If the length is less than the minimum, replace the brush holder and starter yoke.



4. INSPECT STARTER BRUSH HOLDER ASSEMBLY

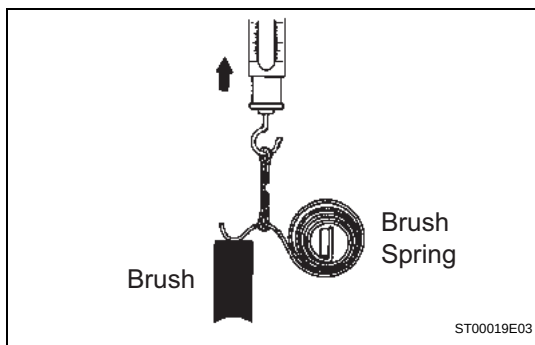
- (a) Check the brush holder insulation.

- (1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brush holders.

Standard:

10 k Ω or higher

If the result is not as specified, replace the brush holder.



- (b) Check the brush spring load.

- (1) Take the pull scale reading as soon as the brush spring separates from the brush.

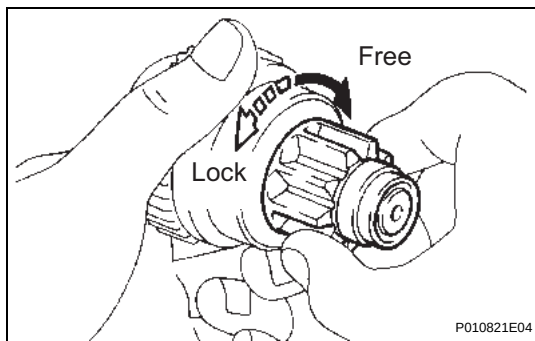
Standard spring load:

21.5 to 27.5 N (2.2 to 2.8 kgf, 4.8 to 6.2 lbf)

Minimum spring load:

12.7 N (1.3 kgf, 2.9 lbf)

If the spring load is less than the minimum, replace the brush holder.

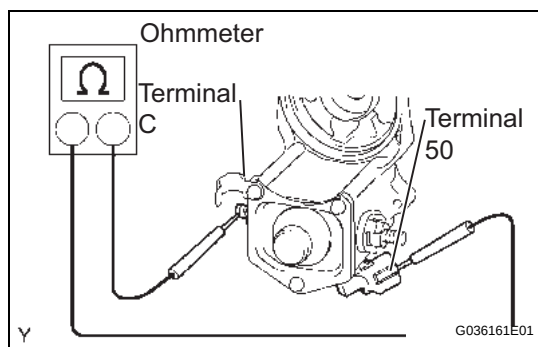


5. INSPECT STARTER CLUTCH SUB-ASSEMBLY

- (a) Check the clutch pinion gear.

- (1) Hold the starter clutch, rotate the pinion gear clockwise and check that it turns freely.
(2) Try to rotate the pinion gear counterclockwise and check that it locks.

If necessary, replace the starter clutch.

**6. INSPECT MAGNET STARTER SWITCH ASSEMBLY**

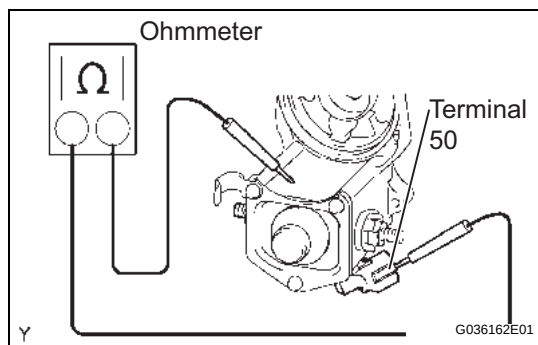
(a) Check the pull-in coil for an open circuit.

- (1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard:

1 Ω or lower

If the result is not as specified, replace the magnet starter switch.



(b) Check the holding coil for an open circuit.

- (1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

Standard:

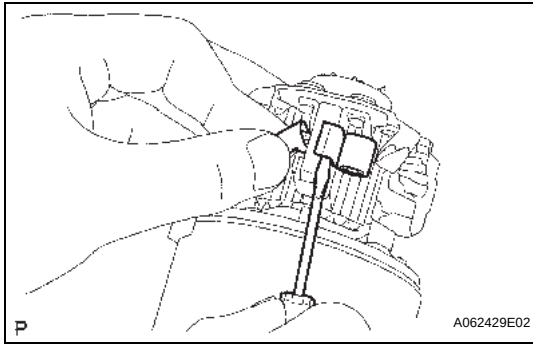
2 Ω or lower

If the result is not as specified, replace the magnet starter switch.

REASSEMBLY

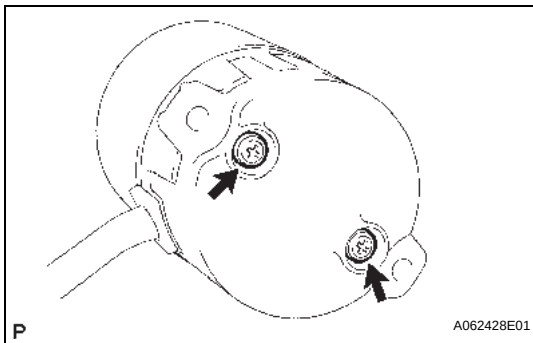
1. INSTALL STARTER ARMATURE ASSEMBLY

- (a) Apply grease to the bearings, and install it onto the starter yoke.



2. INSTALL STARTER BRUSH HOLDER ASSEMBLY

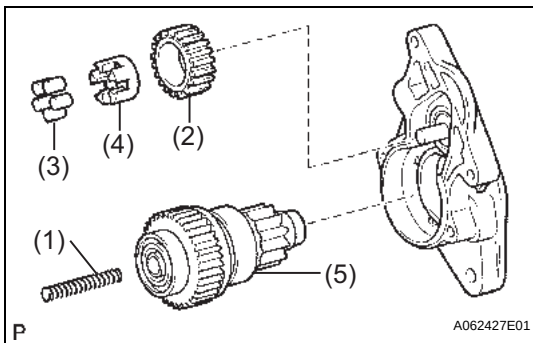
- (a) Place the brush holder on the armature.
 (b) Using a screwdriver, install the 4 brushes.
 (c) Install a new O-ring onto the groove of the field frame.



- (d) Install the end frame with the 2 screws.
Torque: 3.8 N*m (39 kgf*cm, 34 in.*lbf)

3. INSTALL MAGNET STARTER SWITCH ASSEMBLY

- (a) Apply grease to the steel ball, and install it onto the clutch shaft hole.



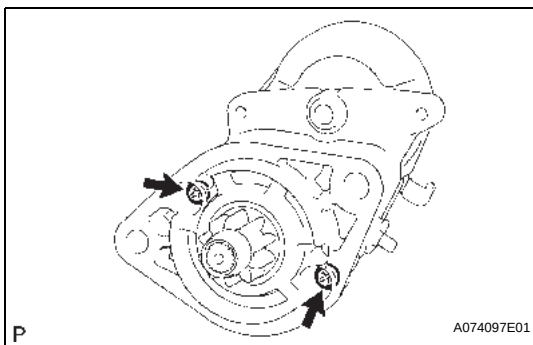
- (b) Apply grease to parts (2)-(5), and install all the parts below onto the starter drive housing.

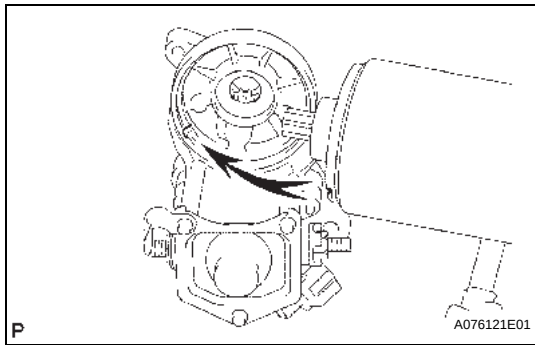
(1)	Starter magnet switch return spring
(2)	Starter idle gear pinion
(3)	Starter idle gear clutch roller
(4)	Starter idle gear retainer
(5)	Starter clutch

- (c) Install the magnet starter switch with the 2 screws.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)

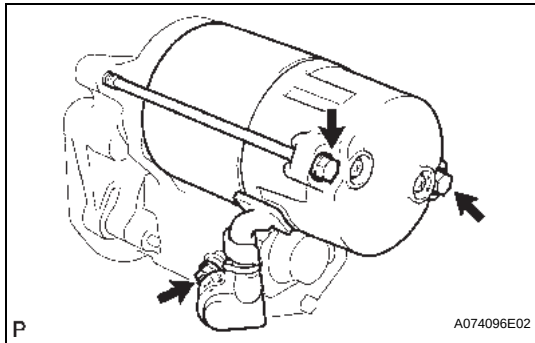
4. INSTALL STARTER YOKE ASSEMBLY

- (a) Install a new O-ring onto the groove of the starter yoke.





- (b) Align the key of the starter yoke with the groove of the magnet starter switch.

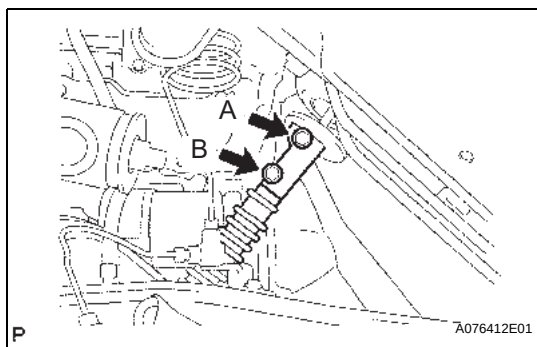


- (c) Install the starter yoke and armature with the 2 through bolts.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)
- (d) Connect the lead wire to terminal C with the nut.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)

INSTALLATION

1. INSTALL STARTER ASSEMBLY

- (a) Install the starter assembly with the 2 bolts.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)
- (b) Install the wire harness to terminal 30 with the nut.
Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)
- (c) Connect the terminal 50 connector to the starter assembly.



2. INSTALL NO.2 STEERING INTERMEDIATE SHAFT

- (a) Install the steering sliding yoke onto steering intermediate shaft No. 2.
- (b) Install bolt B and then tighten bolt B and A.
Torque: 36 N*m (370 kgf*cm, 27 ft.*lbf)

3. INSTALL FRONT FENDER SEAL LH

- (a) Install the front fender splash shield rear LH with the 5 clips.

4. INSTALL NO.2 EXHAUST FRONT PIPE ASSEMBLY

(See page [EX-3](#))

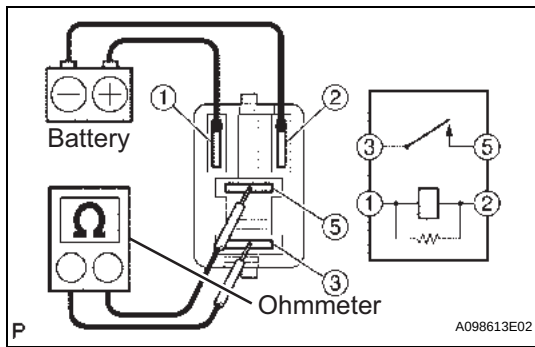
5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)

6. CHECK FOR EXHAUST GAS LEAKAGE

7. INSTALL NO.1 ENGINE UNDER COVER SUB-ASSEMBLY

- (a) Install the engine under cover with the 4 bolts.
Torque: 29 N*m (296 kgf*cm, 21 ft.*lbf)



STARTER RELAY

INSPECTION

1. INSPECT STARTER RELAY

- (a) Check the resistance.
 - (1) Using an ohmmeter, measure the resistance between the terminals.

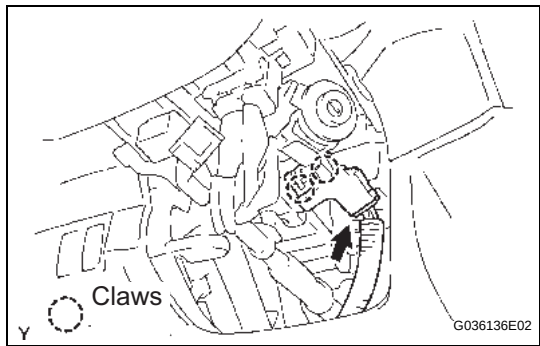
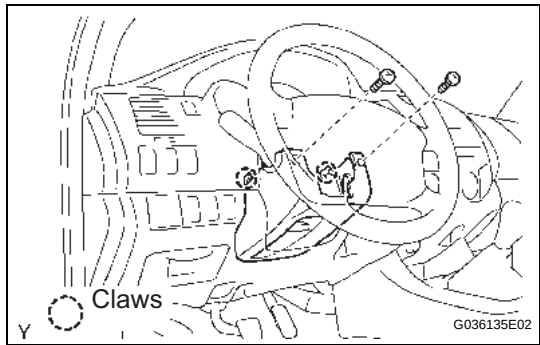
Tester Connection	Specified Condition
3 - 5	10 kΩ or higher
3 - 5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the result is not as specified, replace the starter relay.

IGNITION SWITCH

REMOVAL

- 1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**
- 2. **REMOVE STEERING COLUMN COVER LWR**
 - (a) Remove the 2 screws.
 - (b) Disengage the 2 claws and remove the steering column cover LWR.



- 3. **REMOVE IGNITION SWITCH**
 - (a) Disconnect the connector.
 - (b) Disengage the 2 clamps, then remove the ignition switch.

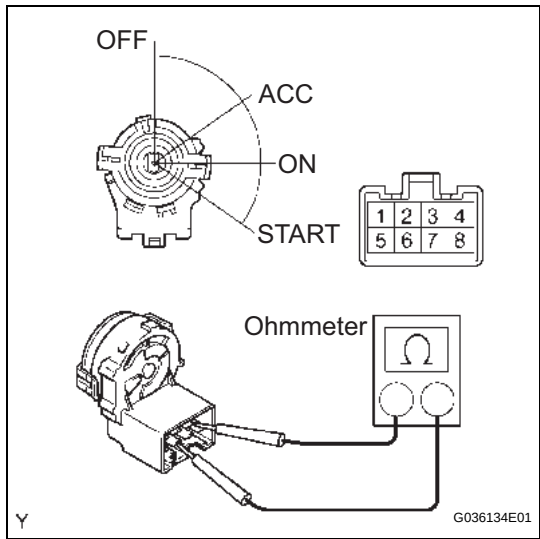
INSPECTION

- 1. **INSPECT IGNITION SWITCH**
 - (a) Check the resistance.
 - (1) Using an ohmmeter, measure the resistance between the terminals.

Standard

Switch Condition	Switch Condition	Specified Condition
LOCK	-	10 kΩ or higher
ACC	1 (AM1)-3 (ACC)	Below 1 Ω
ON	1 (AM1) - 3 (ACC) - 4 (IG1) 7 (IG2) - 8 (AM2)	Below 1 Ω
START	1 (AM1) - 2 (ST1) - 4 (IG1) 6 (ST2) - 7 (IG2) - 8 (AM2)	Below 1 Ω

If the result is not as specified, replace the ignition switch.



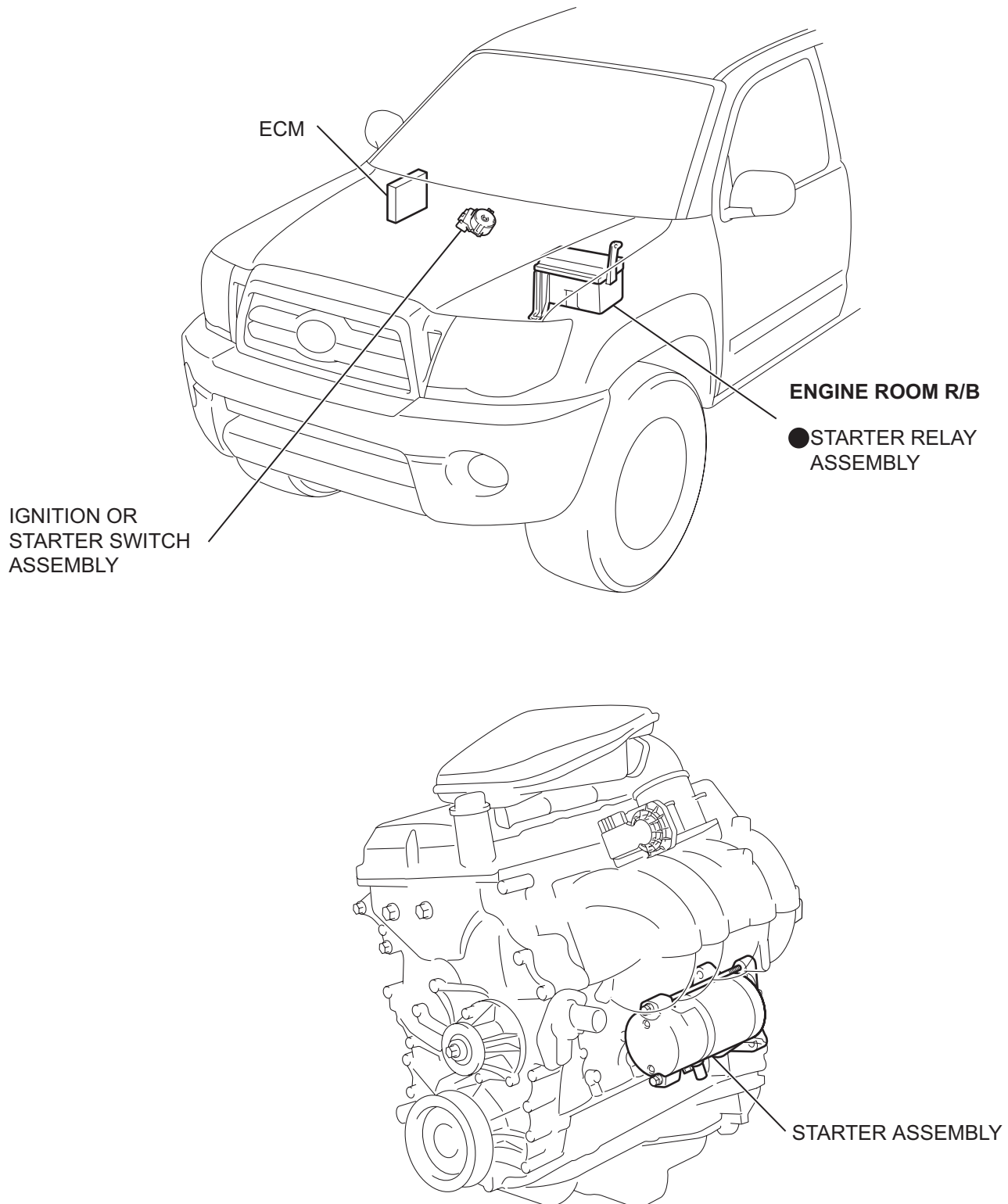
INSTALLATION

1. INSTALL IGNITION SWITCH
2. INSTALL STEERING COLUMN COVER LWR
3. CONNECT CABLE TO NEGATIVE BATTERY
TERMINAL

Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)

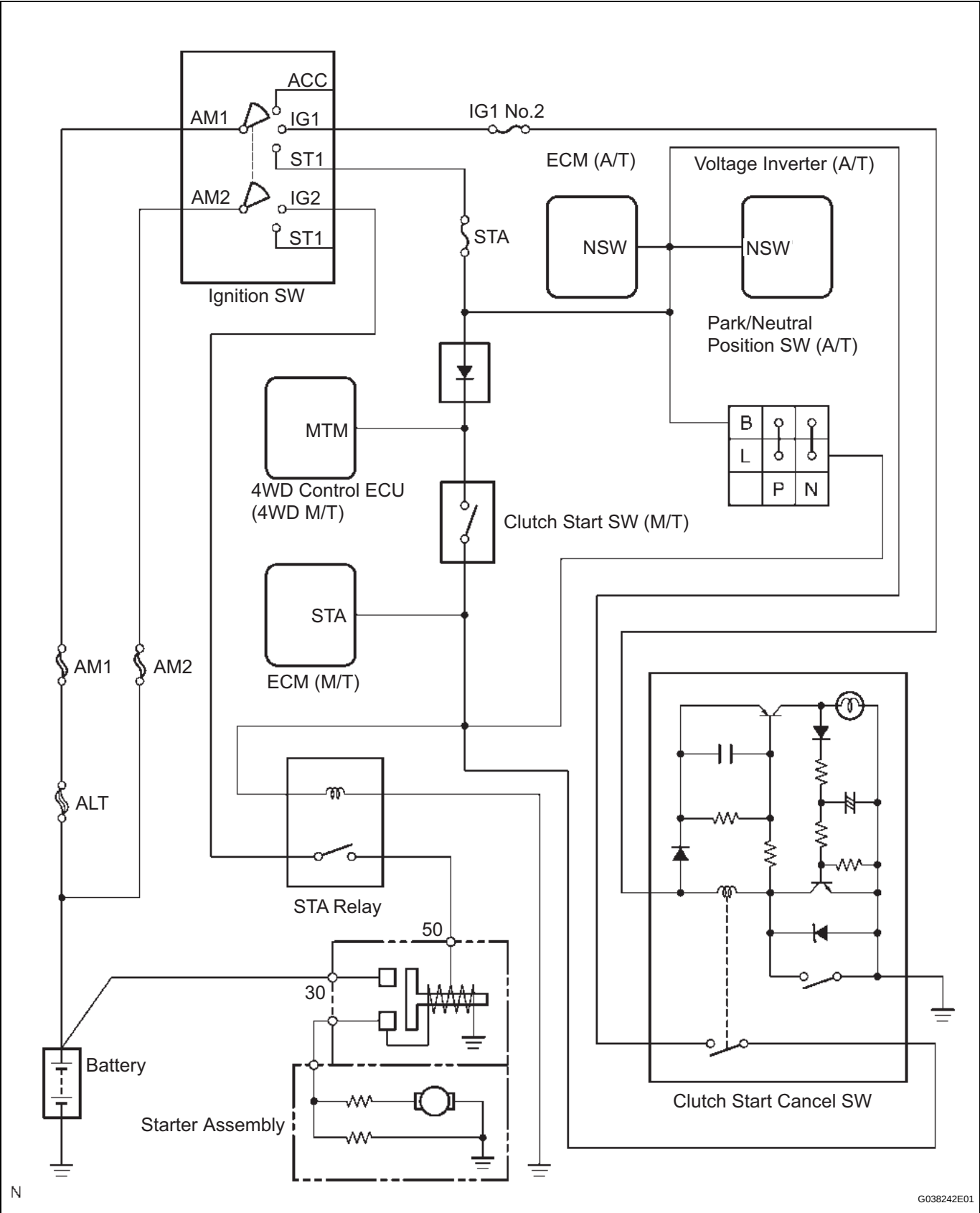
STARTING SYSTEM

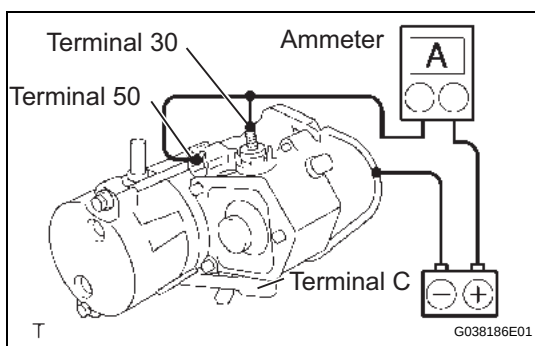
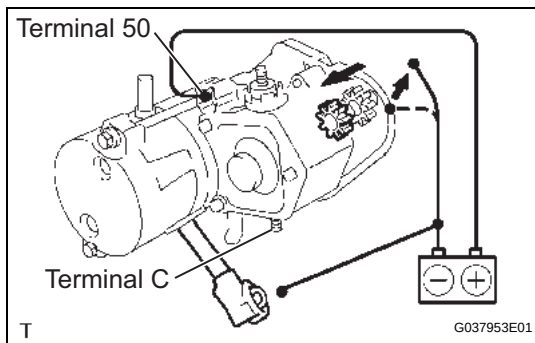
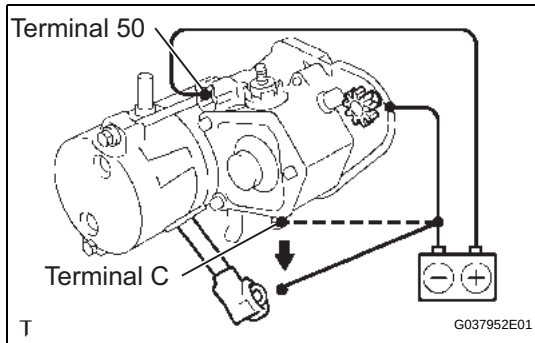
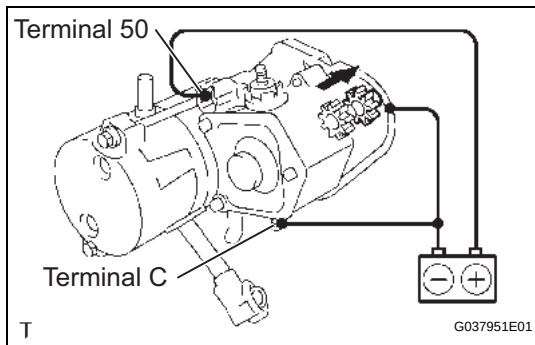
PARTS LOCATION



ST

SYSTEM DIAGRAM





INSPECTION

1. INSPECT STARTER ASSEMBLY

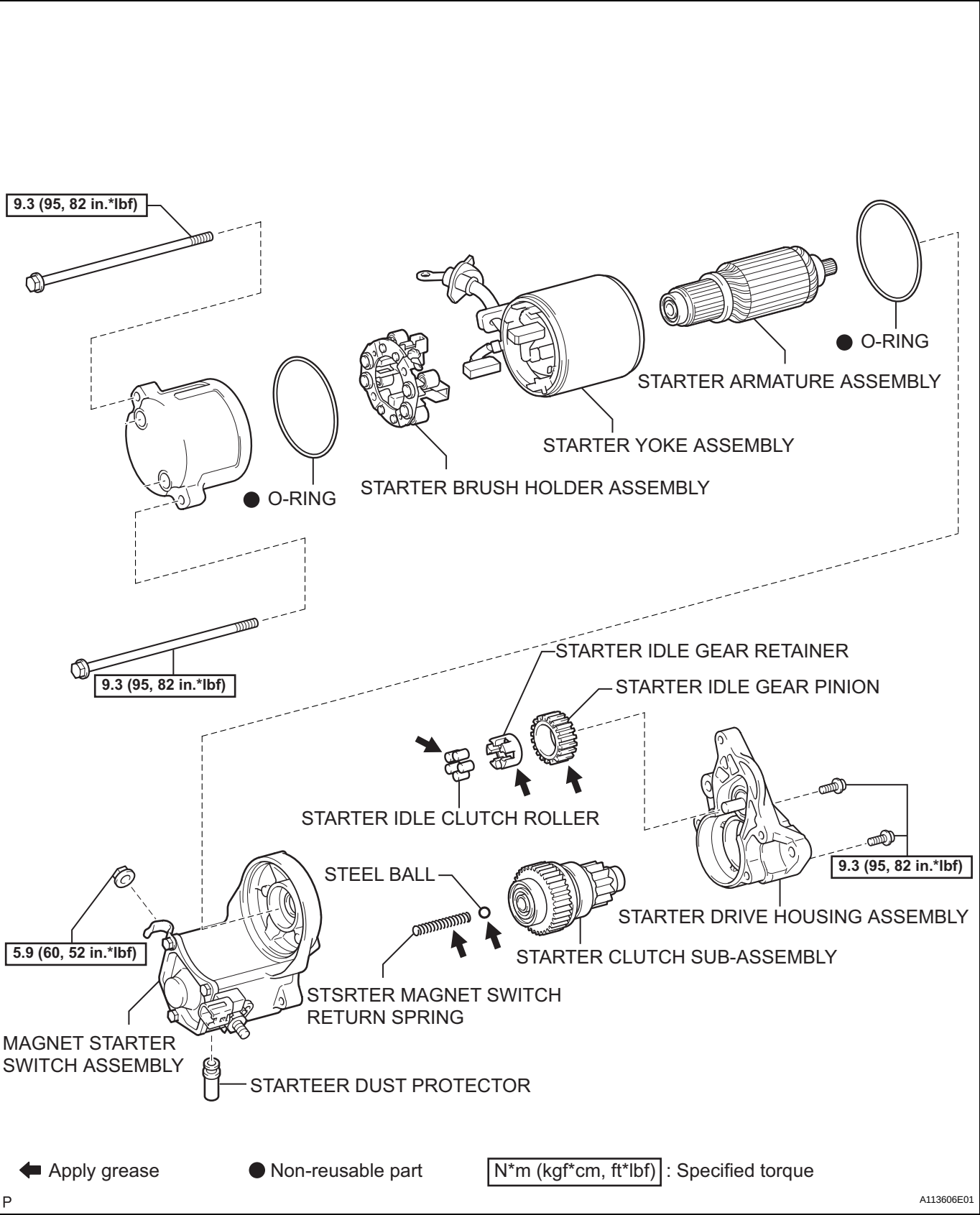
NOTICE:

These tests must be performed within 3 to 5 seconds to avoid burning out the coil.

- (a) Perform the pull-in test.
 - (1) Disconnect the field coil lead wire from terminal C.
 - (2) Connect the battery to the magnetic switch as shown in the illustration. Check that the clutch pinion gear protrudes.
- (b) Perform the hold-in test.
 - (1) Disconnect the negative (-) lead from terminal C with the above condition (a) being sustained. Check that the pinion gear remains extended.
- (c) Check the operation.
 - (1) Disconnect the negative (-) lead from the starter body. Check that the clutch pinion gear returns inward.
- (d) Perform the operation test without any load.
 - (1) Connect the field coil lead wire to terminal C.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)
 - (2) Clamp the starter in a vise.
 - (3) Connect the battery and ammeter to the starter as shown in the illustration.
 - (4) Check that the ammeter indicates the specified current.
Specified current:
100 A or less at 11.5 V

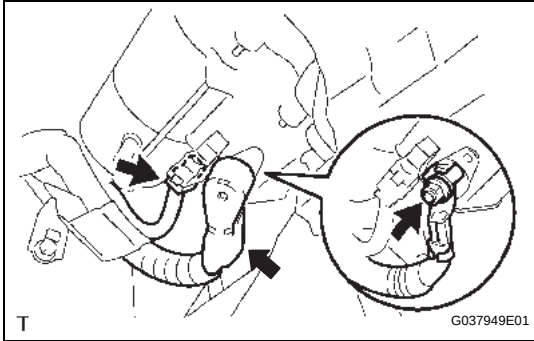
STARTER

COMPONENTS



REMOVAL

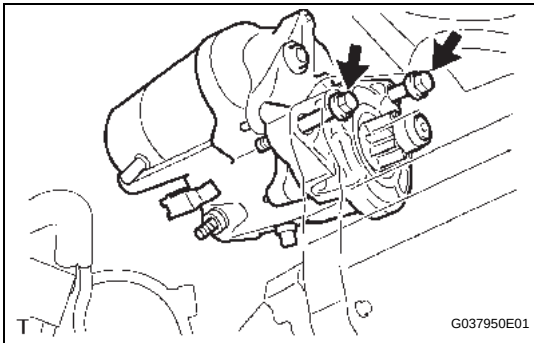
1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL



2. REMOVE STARTER ASSEMBLY

- (a) Remove the terminal cap.
- (b) Remove the nut, then remove the starter wire harness.
- (c) Disconnect the starter connector.

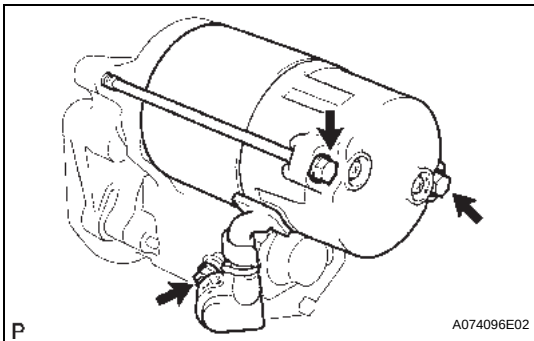
- (d) Remove the 2 bolts, then remove the starter.



DISASSEMBLY

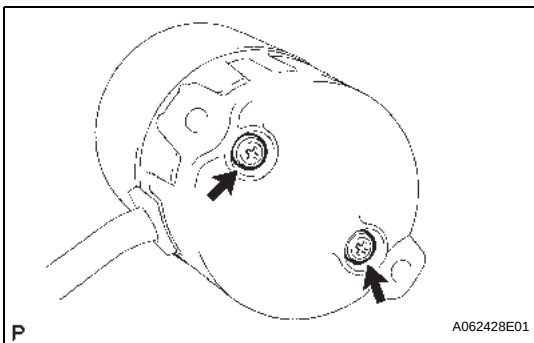
1. REMOVE STARTER YOKE ASSEMBLY

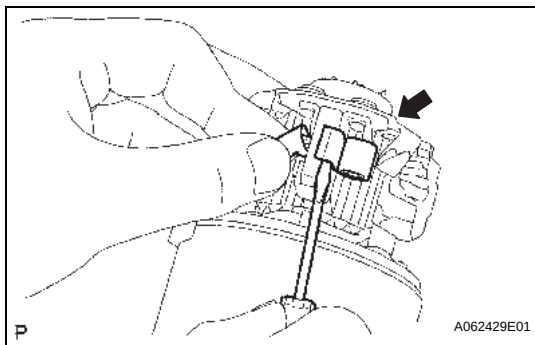
- (a) Remove the nut, then disconnect the lead wire from terminal C.
- (b) Remove the 2 through bolts, then pull the starter yoke and starter commutator end frame out together.
- (c) Remove the O-ring from the starter yoke.



2. REMOVE STARTER BRUSH HOLDER ASSEMBLY

- (a) Remove the 2 screws, then remove the end cover from the starter yoke.
- (b) Remove the O-ring from the starter yoke.



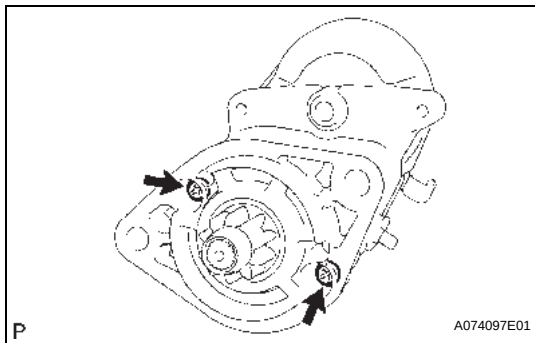


- (c) Using a screwdriver, hold the spring back and disconnect the 4 brushes from the brush holder.
- (d) Remove the brush holder from the starter yoke.

3. REMOVE STARTER ARMATURE ASSEMBLY

NOTICE:

Turn the armature and check that it turns freely.

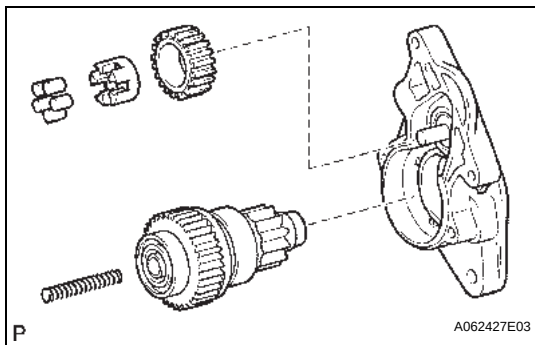


4. REMOVE STARTER CLUTCH SUB-ASSEMBLY

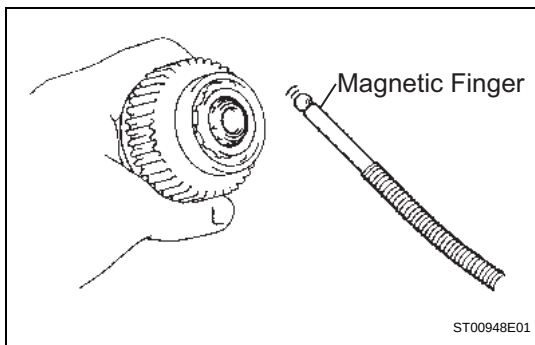
- (a) Remove the 2 screws, then remove the starter drive housing.

NOTICE:

Do not drop the starter idle gear pinion, starter idle gear retainer or starter idle gear clutch roller.



- (b) Remove the starter idle gear pinion from the starter drive housing.
- (c) Remove the starter idle gear retainer from the starter drive housing.
- (d) Remove the starter idle gear clutch roller from the starter drive housing.
- (e) Remove the starter clutch from the starter drive housing.
- (f) Remove the starter magnet switch return spring from the starter drive housing.



- (g) Using a magnetic finger, remove the steel ball from the clutch shaft hole.

INSPECTION

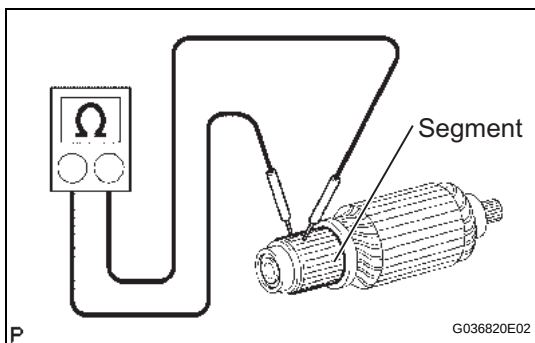
1. INSPECT STARTER ARMATURE ASSEMBLY

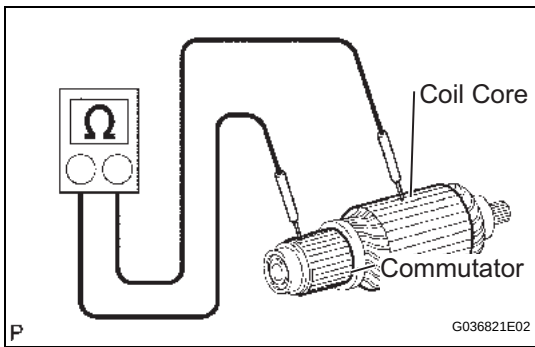
- (a) Check the resistance.
 - (1) Using an ohmmeter, check the resistance between the segments of the commutator.

Standard:

1Ω or lower

If the result is not as specified, replace the starter armature.





- (b) Check the resistance.
- (1) Using an ohmmeter, check the resistance between the commutator and armature coil core.

Standard:**10 k Ω or higher**

If the result is not as specified, replace the starter armature.

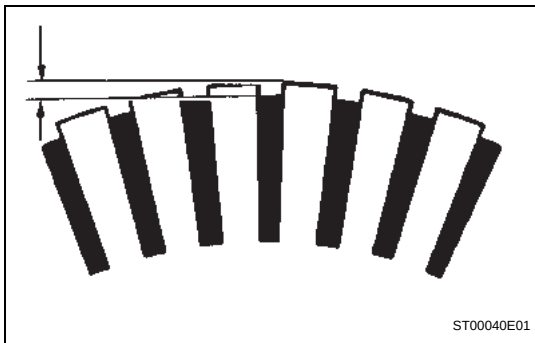
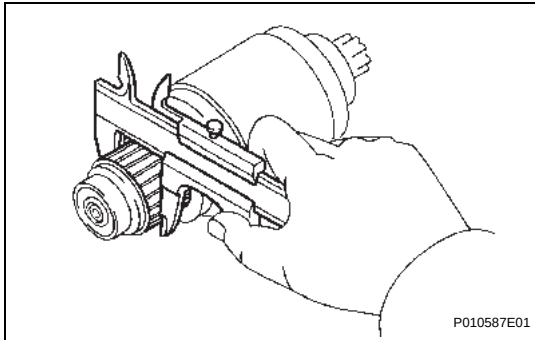
- (c) Check the commutator surface for dirt and burn. If the surface is dirty or burnt, smooth the surface with 400- grit sandpaper or a lathe.

- (d) Check the commutator diameter.

- (1) Using vernier calipers, measure the commutator diameter.

Standard diameter:**35.0 mm (1.378in.)****Minimum diameter:****34.0 mm (1.339in.)**

If the diameter is less than the minimum, replace the armature.

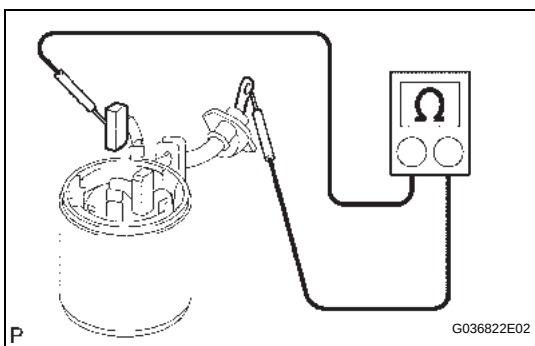


- (e) Check the undercut depth.

- (1) Check that the undercut portion between the segments is free of foreign objects and measure its depth.

Standard undercut depth:**0.7 mm (0.028in.)****Minimum undercut depth:****0.2 mm (0.008in.)**

If the undercut depth is less than the minimum, correct it with a hacksaw blade.

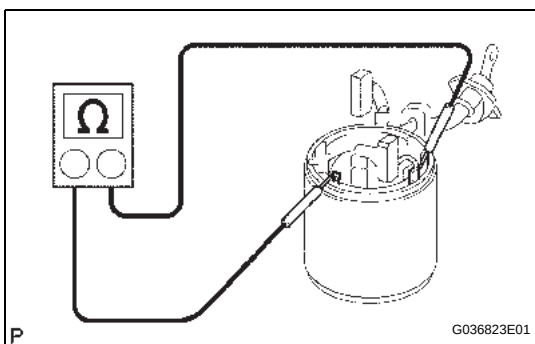
**2. INSPECT STARTER YOKE ASSEMBLY**

- (a) Check the resistance.

- (1) Using an ohmmeter, check the resistance between the lead wire and brushes.

Standard:**1 Ω or lower**

If the result is not as specified, replace the starter yoke.



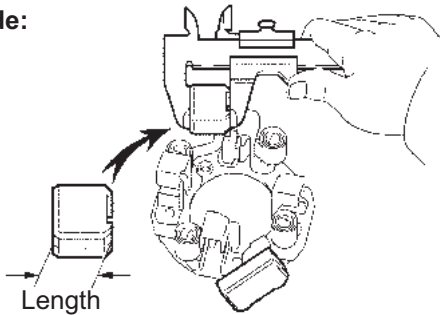
- (b) Check the resistance.

- (1) Using an ohmmeter, check the resistance between shunt coil terminals (A) and (B).

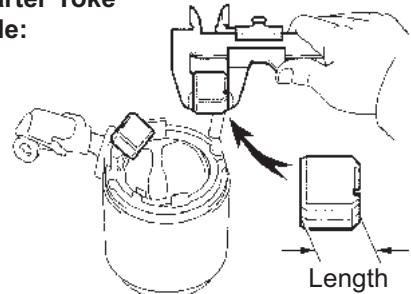
Standard:**1.5 to 1.9 Ω at 20°C(68°F)**

If the result is not as specified, replace the starter yoke.

Brush Holder
Side:



Starter Yoke
Side:



P

A062430E03

3. INSPECT BRUSH

- (a) Check the brush length.

- (1) Using vernier calipers, measure the brush length

Standard length:

15.0 mm (0.591in.)

Minimum length:

9.0 mm (0.354in.)

If the length is less than the minimum, replace the brush holder and starter yoke.

4. INSPECT STARTER BRUSH HOLDER ASSEMBLY

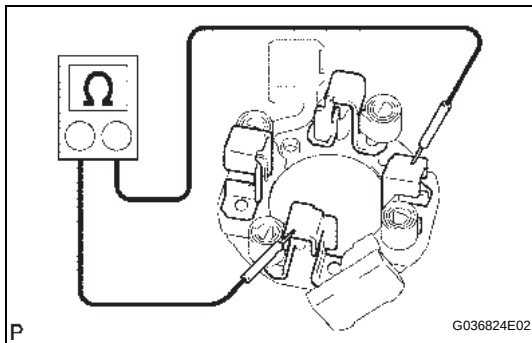
- (a) Check the resistance.

- (1) Using an ohmmeter, measure the resistance between the positive (+) and negative (-) brush holders.

Standard:

10 k Ω or higher

If the result is not as specified, repair or replace the brush holder assy.



P

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- (b) Check the brush spring load.

- (1) Check the pull scale reading as soon as the brush spring is separated from the brush.

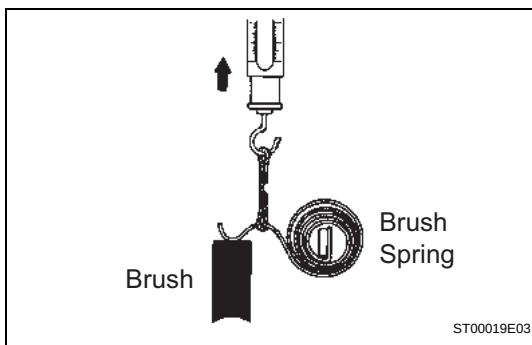
Standard spring load:

21.5 to 27.5 N (2.2 to 2.8kgf, 4.8 to 6.2lbf)

Minimum spring load:

12.7N(1.3kgf, 2.9lbf)

If the spring load is less than the minimum, replace the brush holder assy.



ST00019E03

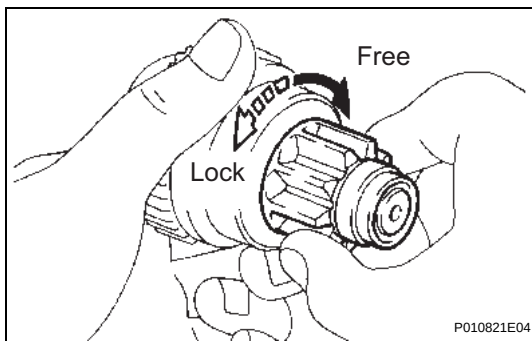
ST

5. INSPECT STARTER CLUTCH SUB-ASSEMBLY

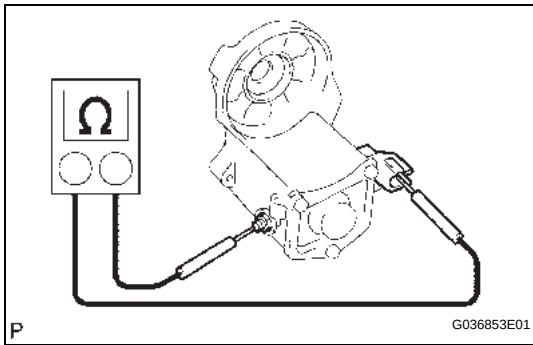
- (a) Check the operation.

- (1) Turn the clutch pinion gear clockwise and check that it turns freely. Try to rotate the clutch pinion gear counterclockwise and check that it locks.

If necessary, replace the starter clutch.



P010821E04



6. INSPECT MAGNET STARTER SWITCH ASSEMBLY

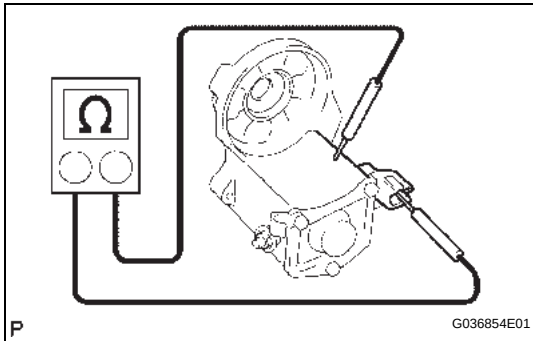
(a) Check the resistance.

- (1) Using an ohmmeter, measure the resistance between terminals 50 and C.

Standard:

1Ω or lower

If the result is not as specified, replace the magnet switch



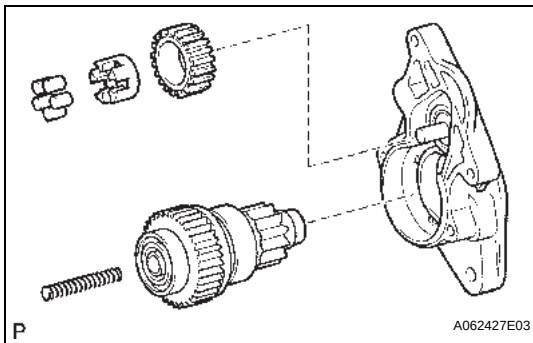
(b) Check the resistance.

- (1) Using an ohmmeter, measure the resistance between terminal 50 and the switch body.

Standard:

2.0Ω or lower

If the result is not as specified, replace the magnet switch.



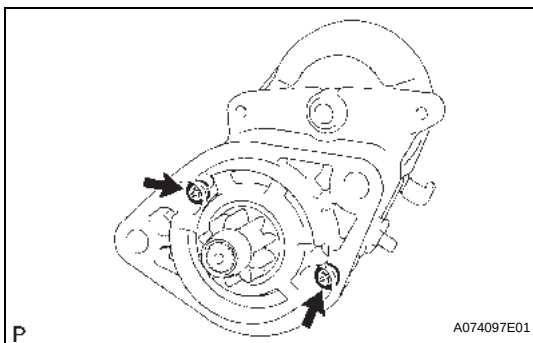
REASSEMBLY

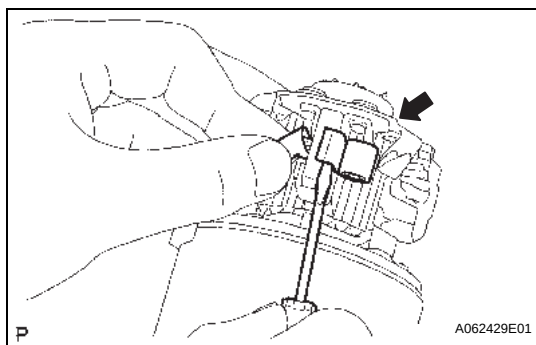
1. INSTALL STARTER CLUTCH SUB-ASSEMBLY

- Apply grease to the steel ball and install it onto the starter drive housing.
- Apply grease to the magnet switch return spring and install it onto the starter drive housing.
- Apply grease to the starter clutch, and install it onto the starter drive housing.
- Apply grease to the starter idle gear clutch roller and install it onto the starter idle gear retainer.
- Apply grease to the starter idle gear retainer and install it onto the starter idle gear pinion.
- Apply grease to the starter idle gear pinion and install it onto the starter drive housing.
- Install the starter drive housing with the 2 screws.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)

2. INSTALL STARTER ARMATURE ASSEMBLY

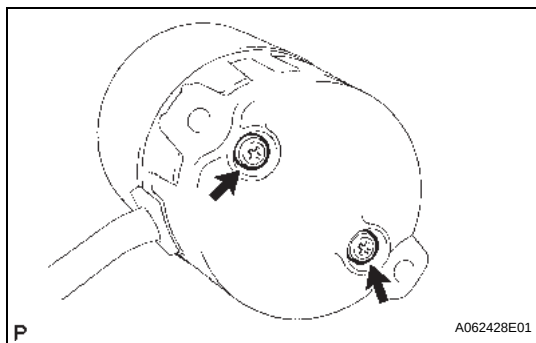
- Apply grease to the bearings and install it onto the starter yoke.



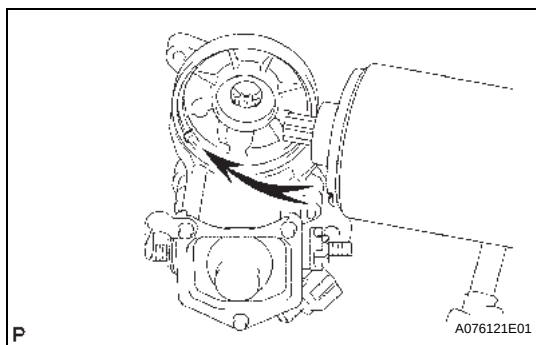


3. INSTALL STARTER BRUSH HOLDER ASSEMBLY

- (a) Place the brush holder assy on the starter yoke.
- (b) Using a screwdriver, install the 4 brushes.
- (c) Install a new O-ring onto the groove of the field frame.

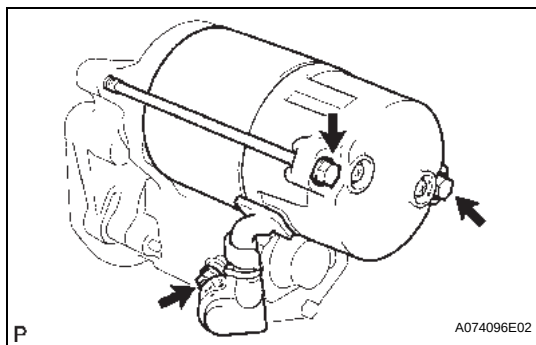


- (d) Install the end frame with the 2 screws.



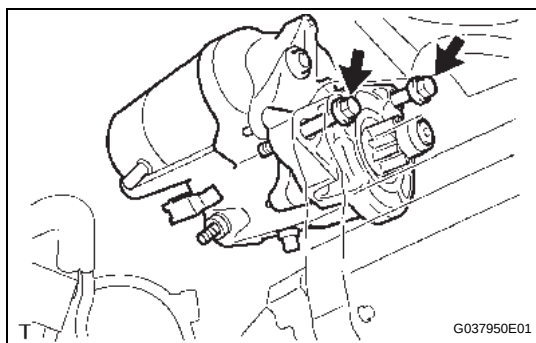
4. INSTALL STARTER YOKE ASSEMBLY

- (a) Install a new O-ring onto the groove of the starter yoke.
- (b) Align the key of the starter yoke with the groove of the magnet starter switch.



- (c) Tighten the 2 through bolts.
Torque: 9.3 N*m (95 kgf*cm, 82 in.*lbf)
- (d) Connect the lead wire to terminal C with the nut.
Torque: 5.9 N*m (60 kgf*cm, 52 in.*lbf)

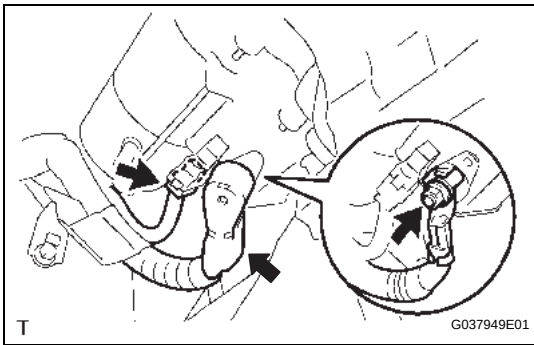
ST



INSTALLATION

1. INSTALL STARTER ASSEMBLY

- (a) Install the starter with the 2 bolts.
Torque: 37 N*m (377 kgf*cm, 27 ft.*lbf)



- (b) Connect the starter connector.
- (c) Install the starter wire harness with the nut.
Torque: 9.8 N*m (100 kgf*cm, 7 ft.*lbf)
- (d) Install the terminal cap.

**2. CONNECT CABLE TO NEGATIVE BATTERY
TERMINAL**

Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)



1. INSPECT STARTER RELAY

- (a) Check the resistance.
 - (1) Using an ohmmeter, measure the resistance between the terminals.

Tester Connection	Specified Condition
3-5	10k Ω or higher
3-5	Below 1 Ω (Apply battery voltage to terminals 1 and 2)

If the result is not as specified, replace the starter relay.

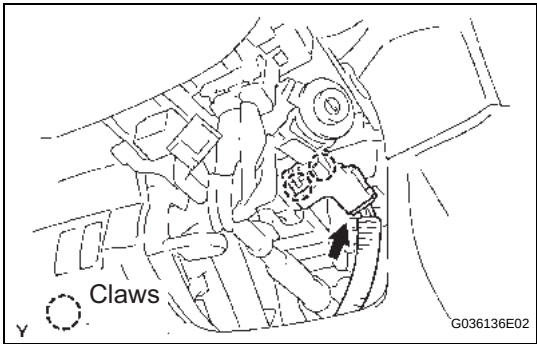
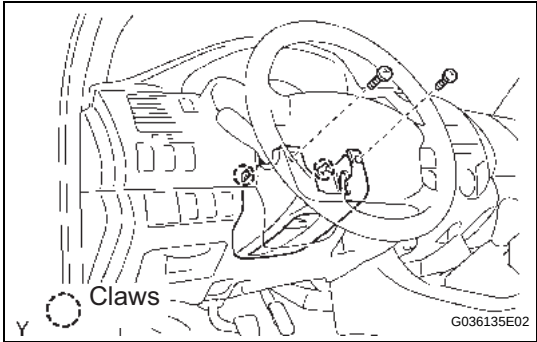
IGNITION SWITCH

REMOVAL

1. **DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

2. **REMOVE STEERING COLUMN COVER LWR**

- (a) Remove the 2 screws.
(b) Disengage the 2 claws and remove the steering column cover LWR.



3. **REMOVE IGNITION SWITCH**

- (a) Disconnect the connector.
(b) Disengage the 2 clamps, then remove the ignition or starter switch.

INSPECTION

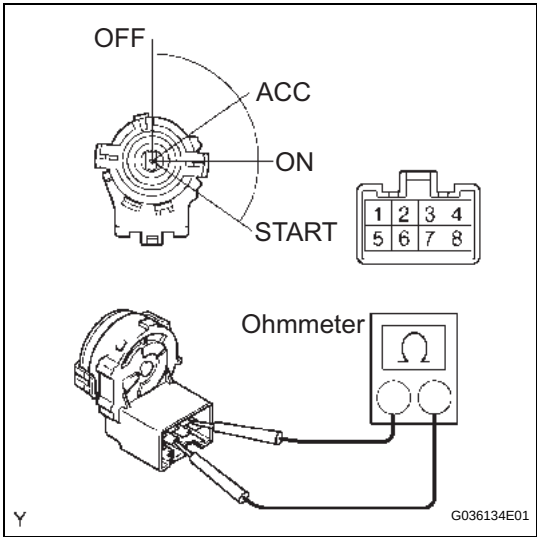
1. **INSPECT IGNITION SWITCH**

- (a) Check the resistance.
(1) Using an ohmmeter, measure the resistance between the terminals.

Standard

Switch Condition	Tester Connection	Specified Condition
LOCK	-	10 kΩ or higher
ACC	1 (AM1) -3 (ACC)	Below 1Ω
ON	1 (AM1) -3 (ACC) -4 (IG1) 7 (IG2) -8 (AM2)	Below 1Ω
START	1 (AM1) -2 (ST1) -4 (IG1) 6 (ST2) -7 (IG2) -8 (AM2)	Below 1Ω

If the result is not as specified, replace the ignition switch.



INSTALLATION

1. INSTALL IGNITION SWITCH
2. INSTALL STEERING COLUMN COVER LWR
3. CONNECT CABLE TO NEGATIVE BATTERY
TERMINAL

Torque: 3.9 N*m (40 kgf*cm, 35 in.*lbf)